C104H/HS User's Manual

Universal 4-port Serial Board

Seventh Edition, June 2008

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C104H/HS User's Manual

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About This Manual

This manual is composed of six Chapters and one Appendix. This manual is written for installer, system administrator and software programmer.
If you are a first-time installer and system administrator, we recommend you to go through the whole manual except Chapter 4.

If you are a software programmer, you may refer to Chapter 4 “Serial Programming Tools”.

If you need cable wiring information, please see Chapter “Connection Cable and Cable Wiring”.

If you encounter any problem during installation, please refer to Chapter “Troubleshooting”.

H In this manual, C104 Series refers to C104H and C104HS.

Chapter 1 Introduction
Overview and features of the Smartio C104 Series boards, list of items and overall installation guide.

Chapter 2 Hardware Installation
Hardware installation for the Smartio C104 Series boards and connection cable.

Chapter 3 Software Installation
This Chapter details the software installation, configuration, driver loading/unloading, driver upgrade and removal for various operating systems: Windows NT, Windows 95/98, DOS and Windows 3.x.

Chapter 4 Serial Programming Tools
This Chapter roughly describes the programming tools for various O.S. platforms, including *PComm* under Windows NT, Windows 95/98, API-232 under DOS and Windows 3.x.

Chapter 5 Connection Cable and Cable Wiring
This Chapter describes the RS-232 cable wiring for the connection cable.

Chapter 6 Troubleshooting
This Chapter describes the problems and possible answers for Smartio C104 Series boards.

Appendix Technical Reference
Specification details, UART, I/O port address map, and DB37 pinouts are described.

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1

Introduction

Overview

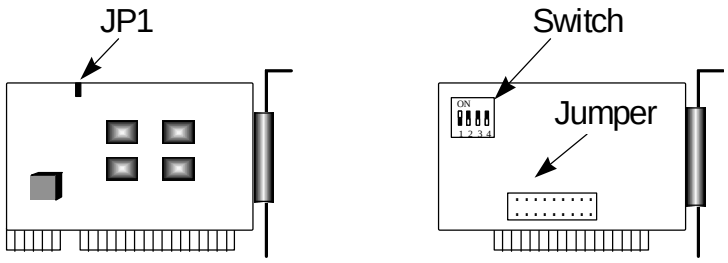
Smartio - The Smart Multiport Async Solutions

The term Smartio stands for smart multiport serial I/O solution. The **Smartio C104 Series** multiport boards offer 4 serial ports for connecting terminals, modems, printers, data acquisition equipment and any other serial devices to the PC/AT and its compatible systems. With the well-designed and fine-tuned device driver, the Smartio boards make full use of the 32 byte Tx/Rx FIFO and on-chip H/W flow control, so that they can transfer data without data loss even at high speed such as 921.6 Kbps, which offers a reliable and high performance solution for serial multiport communications.

The Smartio C104 Series is equipped with **custom-designed ASIC chip** which replaces lots of conventional ICs and reduces the board to half-size. The whole family supports 16 bit architecture. Full range of I/O addresses and IRQs are available. In addition, with **on-board EEPROM** for storing the configuration data, the family is designed without jumper or switch. These features make each port on the board truly independent to any other port and thus compatible with most existing multiport boards.

The Smartio Series is also available in PCI bus. Please contact MOXA dealer/distributor or MOXA Web site for more details.

Hardware Configuration Method



New : set I/O address and IRQ via software Utility.

Traditional : set switch and and jumper manually for I/O address and IRQ.

Instead of using traditional jumper or switch for IRQ and I/O address settings, hardware configuration of each port is easily set by DOS utility, **Io-irq.exe**, which read and write the on-board EEPROM for configuration information through the **CAP** (**Configuration Access Port**) **address**. The CAP address is the only channel via which the configuration utility Io-irq.exe can access the board, which is identical to **the first port's base I/O address**.

The only jumper, **JP1**, is designed in case that users forget the CAP address. Normally JP1 is left open. When JP1 is short, the CAP address is forced to a fixed I/O address, **0xA700**. However, to adopt quick installation (described later), it is a must to keep JP1 always short.

Quick Installation

To ease the hardware configuration, users who install **only one Smartio C104 Series board under Windows NT/95/98** are recommended to adopt **quick installation** described in Chapter 2.

Because the series is so flexible in hardware configuration that they are compatible virtually with all kinds of other manufacturer's multiport boards using 16450 or 16550 UART.

Surge Protection

To prevent the boards from damage caused by lighting or high potential voltage, **surge protection** technology is introduced in some model to protect the board.

Operating System Support

The series is operational under most popular operating systems such as Windows NT, Windows 95/98, SCO UNIX/XENIX/OpenServer, DOS, Windows 3.x, OS/2, Linux, QNX, FreeBSD, etc. However, **MOXA device drivers** for Windows NT, Windows 95/98, Linux, DOS and Windows 3.x are provided for easier installation, configuration and better performance. In this manual, chapters for MOXA **Windows NT**, **Windows 95/98**, **DOS** and **Windows 3.x** device drivers are included. For other compatible systems not mentioned, please refer to the respective operating system's manual for how to install and configure the standard driver.

MOXA Serial Comm Tool

For easy application development, MOXA provides an easy-use serial communication library under Windows NT/95/98 (***PComm***) and Windows 3.x/DOS (**API-232**). Users can use this library to develop your own applications using Microsoft C, Turbo C, Assembly, QuickBASIC, Turbo Pascal, Clipper, Visual Basic, Visual C++, Borland Delphi, etc. **Utilities**, such as diagnostic and monitor, are included for diagnosing the board/port or monitoring the communication status.

Wide Applications

The Smartio C104 Series are suitable for many applications. Here are a few:

- Internet/Intranet Connection
- Remote Access Application
- Multi-user Application
- Industrial Automation
- Office Automation
- Telecommunication
- PC-based (vending) Machine or Kiosk System
- Point-of-Sale (POS) System

Features

The Smartio C104 Series consists of members as follows,

C104H 4 port RS-232, high speed 16550C or compatible UART
C104HS 4 port RS-232, surge protection, 16550C or compatible UART

- Custom-designed ASIC, compact board size (half-size)
- No switch no jumper, easily configured by software
- Independent I/O address, IRQ setting for each of 4 serial ports
- 16 bit AT bus architecture, more IRQs supported
- Surge protection for RS-232 (C104HS)
- High speed 16550C Communication Controller with on-chip hardware flow control, no data loss
- ***PComm*** serial communication tool
- Support popular OS ¡ Windows NT, Windows 95/98, DOS, Windows 3.x, Linux
- Compatible with many other OS ¡ QNX, SCO UNIX/OpenServer, SCO XENIX, PICK OS, Multiuser DOS, Free BSD, OS/2

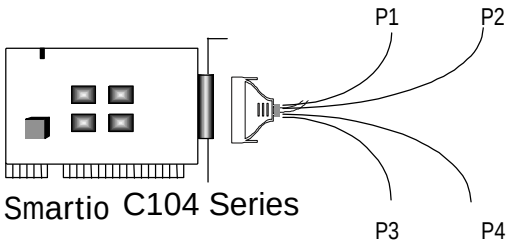
	C104H/HS
Windows NT	P
Windows 95/98	P
DOS	P
Windows 3.x	P
Linux	R
QNX	C
SCO UNIX/OpenServer	C
SCO XENIX	C
FreeBSD	C
OS/2	C

P: Driver supported by Moxa and shipped with product
R: Driver supported by Moxa but sent by request
C: Driver supported by OS
Note: MOXA FTP site is available for driver download

Check List

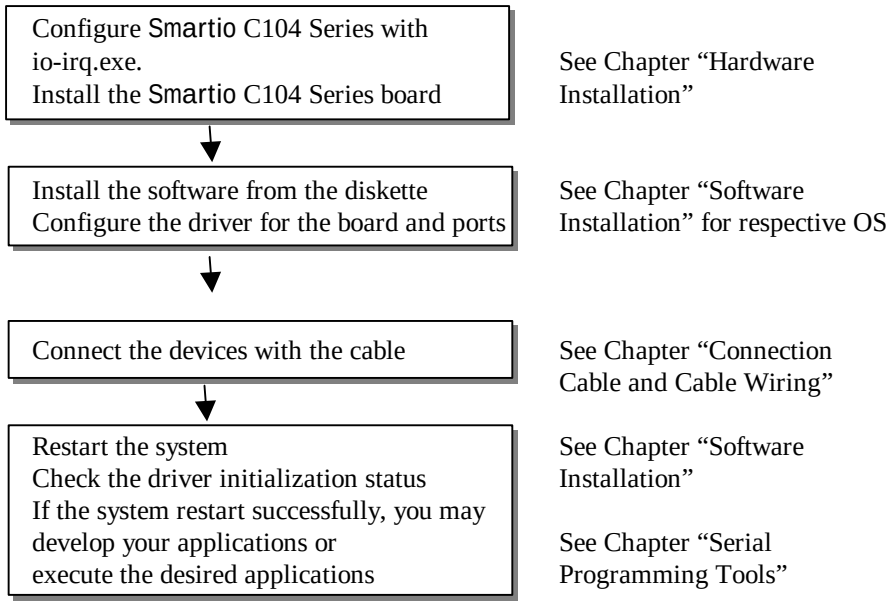
Upon unpacking the Smartio C104 Series package, you should find the following items in the package,

- Smartio C104 Series 4-port high performance async board
- Device driver diskettes:
  - Windows NT and Windows 95/98 ¡ 1Ñ
  - DOS/Windows 3.x ¡ 1Ñ
- C104H/HS User's Manual (This Manual)
- PComm Lite diskette ¡ 1Ñ
- Opt 4C: DB37 to 4 ¡ DB25 male connectors or
  Opt 4D: DB37 to 4 ¡ DB9 male connectors



Installation Guide

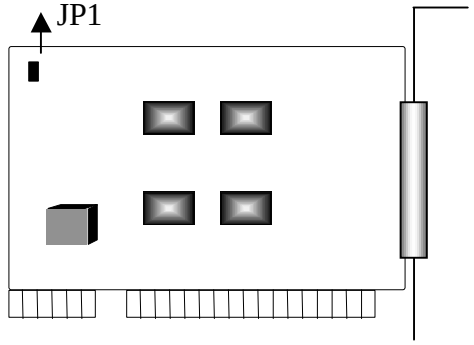
This section gives a brief summary of how to install the Smartio C104 Series under each supported operating system. The installation is simple and involves the following stages:


Configure Smartio C104 Series with io-irq.exe.
Install the Smartio C104 Series board
See Chapter “Hardware Installation”
Install the software from the diskette
Configure the driver for the board and ports
See Chapter “Software Installation” for respective OS
Connect the devices with the cable
See Chapter “Connection Cable and Cable Wiring”
Restart the system
Check the driver initialization status
If the system restart successfully, you may develop your applications or execute the desired applications
See Chapter “Software Installation”
See Chapter “Serial Programming Tools”

2

Hardware Installation

The installation of the Smartio C104 Series consists of hardware and software installation. The hardware installation is detailed in this chapter. The next chapter deals with the software installation for various operating systems.



Smartio C104 Series

Default Settings

The Smartio C104 Series has the following default (factory) settings:

I/O address: **0x180** (Port 1), **0x188** (Port 2), **0x190** (Port 3), **0x198** (Port 4)
IRQ: **10**
INT Vector: **0x1C0**
CAP Jumper JP1: **Open**

Note ! **If the default settings above are what you desire and good for the system without conflicts, you may simply install the board in the system and go directly to the next chapter, "Software Installation". Otherwise, follow the instructions below.**

Now you should do either **the normal hardware installation** (detailed in the later section, "Hardware Installation with IO-IRQ Utility") or **the quick hardware installation** (detailed right in the next section, "Quick Hardware Installation"). The latter is provided to facilitate the hardware installation, only under the circumstances that:

- **Only one Smartio C104 Series board** is allowed to install in a system.
- **Windows NT and 95/98** are the only operating systems supported.
- I/O address **0xA700** must be free

Quick Hardware Installation

To fully utilize the superior feature of flexible hardware configuration design of the Smartio C104 Series, a quick and easy method of installation is designed for users, which absolutely free the users from hardware configuration effort, i.e., **installation without running configuration program: Io-irq.exe**. Simply always short the jumper JP1. The software and hardware configuration will be completed at the same time while doing the software configuration.

Besides, the speed range will be set to **from 50 to 921.6K bps by default**, which is called **High Speed Spectrum** and detailed in the section, "Hardware Installation with IO-IRQ Utility".

How to Do Quick Hardware Installation

Users who install **only one Smartio C104 Series board under Windows NT/95/98** are strongly recommended to do the quick installation as follows:

1. **Short the jumper JP1** on the upper-left corner of the board.

2. Plug the board in PC with the desired system installed, which is powered off in advance.

3. Process software installation, detailed in the next chapter.

This is to specify the desired I/O address, IRQ and INT Vector in the software configuration panel, no matter what hardware settings are on the board. The software

configuration program will automatically update the hardware settings.
After this, users already complete the whole installation.

4. Shutdown System (Windows NT/95/98).

5. DO power OFF and then ON (or Reset) the PC. (**Please cold start.**)

6. Restart System (Windows NT/95/98).

It is very important to keep the JP1 always short in this case. Without running the hardware configuration program, Io-irq.exe under DOS prompt, the software configuration program will automatically update the hardware settings of the board while updating the software settings. This saves the trouble doing hardware configuration. However, remember to **cold start the system every time the configuration changed.**

Hardware Installation with IO-IRQ Utility

This section is for those who can not use quick hardware installation:

- Install two or more Smartio C104 Series boards in a system.
- Fail to install, due to the I/O address 0xA700 is not available or has conflict in the system.
- Use operating systems other than Windows NT and 95/98.

Before proceeding the **software installation**, detailed in the next chapter, "Software Installation", do **hardware configuration** to setup the I/O address and IRQ with **"Io-irq.exe"**, detailed in the next section.

Remember to keep the hardware settings in mind for the software installation.

The Smartio C104 Series has the following default (factory) settings:

I/O address : **0x180** (Port 1), **0x188** (Port 2), **0x190** (Port 3), **0x198** (Port 4)
IRQ : **10**
INT Vector : **0x1C0**

Because the ASIC-designed Smartio C104 Series has no switch and no jumper for configuring manually the I/O address, IRQ, INT vector, etc. of the boards, you **must**

run the software utility, **Io-irq.exe**, in the driver diskette under **DOS** system to change the hardware configuration.

1. Choose a PC that has **DOS** system inside.

2. Power off the PC.

3. Make sure no hardware conflict and plug the board in a free 16-bit slot of the PC, **one board at a time with JP1 open**.

> H If you are installing multiple boards, insert one board at a time and configure it using the Io-irq program before inserting the next board. This is to prevent conflict between two boards with same default hardware settings.
> The Smartio C104 Series has the following default (factory) settings,
> I/O address: **0x180** (Port 1), **0x188** (Port 2), **0x190** (Port 3), **0x198** (Port 4)
> IRQ: **10**
> INT Vector: **0x1C0**
> Configuration Access Port (CAP): **0x180**

4. Power on the PC and enter into **DOS** system.

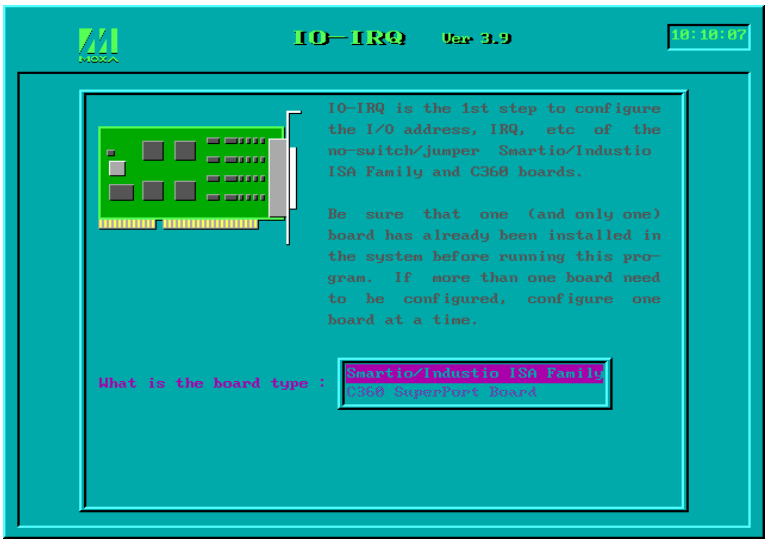
5. Run the utility "**Io-irq.exe**" contained in the driver diskette to set up I/O address, IRQ and INT vector of the board. Please refer to the next section, "IO-IRQ Utility and Hardware Configuration" for more details. Or follow the on-line help to configure the Smartio C104 Series board.

   After completing the hardware configuration, the board is ready for use under operating systems, such as Windows NT and 95/98, DOS, Windows 3.x, etc.

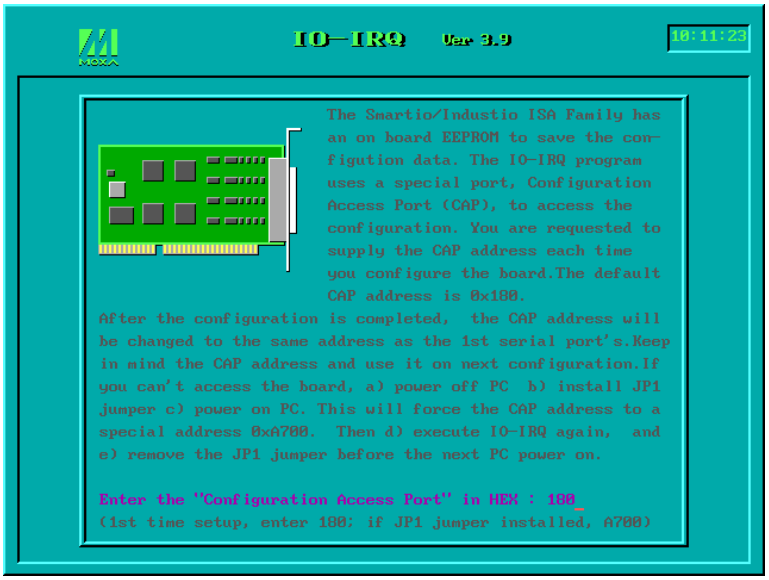
IO-IRQ Utility and Hardware Configuration

Note that the CAP address, e.g. 0x180, is identical to **the first port's I/O address** except in one case that the JP1 jumper is installed before powering on the PC. In this case, the CAP address will be forced to **0xA700**. The CAP address must be typed correctly. With the correct CAP address, the utility can find the configuration stored in the **on-board EEPROM** and display it on the configuration panel. The CAP address is the only channel via which the configuration utility Io-irq.exe can access the board.

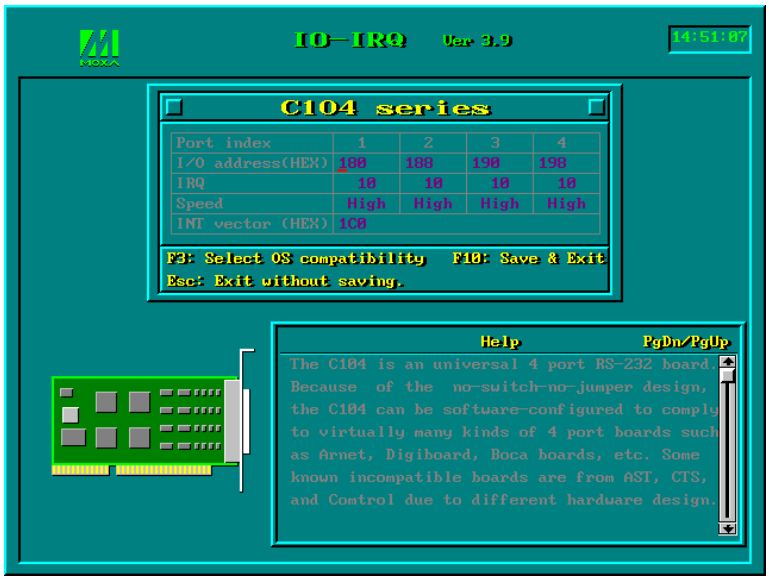
1. Run the utility "**Io-irq.exe**" contained in the driver diskette to set up I/O address, IRQ and INT vector of the board.


IO-IRQ Ver 3.9
10:10:07
IO-IRQ is the 1st step to configure the I/O address, IRQ, etc of the no-switch/jumper Smartio/Industio ISA Family and C360 boards.
Be sure that one (and only one) board has already been installed in the system before running this program. If more than one board need to be configured, configure one board at a time.
What is the board type :
Smartio/Industio ISA Family
C360 SuperPort Board

2. Select "Smartio/Industio ISA Family" and press ENTER key.


IO-IRQ Ver 3.9
10:11:23
The Smartio/Industio ISA Family has an on board EEPROM to save the configution data. The IO-IRQ program uses a special port, Configuration Access Port (CAP), to access the configuration. You are requested to supply the CAP address each time you configure the board.The default CAP address is 0x180.
After the configuration is completed, the CAP address will be changed to the same address as the 1st serial port's.Keep in mind the CAP address and use it on next configuration.If you can't access the board, a) power off PC b) install JP1 jumper c) power on PC. This will force the CAP address to a special address 0xA700. Then d) execute IO-IRQ again, and e) remove the JP1 jumper before the next PC power on.
Enter the "Configuration Access Port" in HEX : 180
(1st time setup, enter 180; if JP1 jumper installed, A700)

3. Enter the CAP address of the Smartio C104 Series board to be configured.


IO-IRQ
Ver 3.9
14:51:07
C104 series
Port index 1 2 3 4
I/O address(HEX) 100 108 190 198
IRQ 10 10 10 10
Speed High High High High
INT vector (HEX) 1C0
F3: Select OS compatibility F10: Save & Exit
Esc: Exit without saving.
Help PgDn/PgUp
The C104 is an universal 4 port RS-232 board. Because of the no-switch-no-jumper design, the C104 can be software-configured to comply to virtually many kinds of 4 port boards such as Arnet, Digiboard, Boca boards, etc. Some known incompatible boards are from AST, CTS, and Comtrol due to different hardware design.

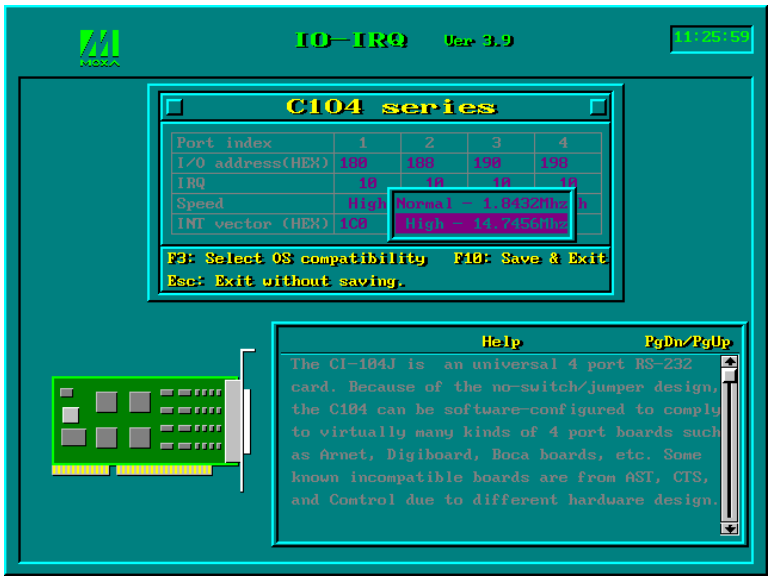
4. Configure the following parameters as necessary.

Port Index Indicate the port index for each port.

I/O address Enter the base I/O address for each port, either sequentially or not. Avoid to conflicting with any other devices.

IRQ Enter the IRQ, 2, 3, 4, 5, 7, 10, 11, 12 or 15, for each port, independently or not.

Speed This field specifies the use of **normal or high speed** capability. Normal speed ranges from 50 bps to 115.2 Kbps. High speed ranges from 50 bps to 921.6 Kbps. Smartio C104 Series support both normal and high speed spectra.


IO-IRQ
Ver 3.9
11:25:59
C104 series
Port index 1 2 3 4
I/O address(HEX) 100 108 190 198
IRQ 10 10 10 10
Speed High Normal - 1.0432Mhz
INT vector (HEX) 1C0 High - 14.7456Mhz
F3: Select OS compatibility F10: Save & Exit
Esc: Exit without saving.
Help PgDn/PgUp
The CI-104J is an universal 4 port RS-232 card. Because of the no-switch/jumper design, the C104 can be software-configured to comply to virtually many kinds of 4 port boards such as Arnet, Digiboard, Boca boards, etc. Some known incompatible boards are from AST, CTS, and Comtrol due to different hardware design.

Note that, currently, port that uses **MOXA Windows NT and 95/98 driver** will run at the displayed speed. To be clear, when Smartio C104 Series board is configured as **High Speed Spectrum**, any port driven by the **Moxa-provided Windows NT and 95/98 driver** will display the exact working speed. For example, the displayed speed 38.4 Kbps is equal to the working speed 38.4 Kbps.

However, if the port is driven by **NON Moxa-provided driver**, such as **standard serial driver**, or Moxa drivers other than Windows NT and 95/98, such as **DOS**, the real working speed is equal to **8 times** of the displayed speed. For example, a port, if set to Normal Speed Spectrum with 38.4 Kbps, will work at 38.4 Kbps for sure; while a port, if set to High Speed Spectrum with displayed speed 38.4 Kbps, will actually work at 307.2 Kbps (38.4 Kbps ¡ 8Ñ).

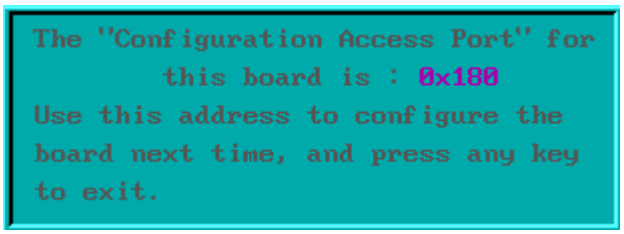
The following is the **8 times speed mapping list** for quick reference purpose, **particularly for DOS driver**.

Normal Speed Spectrum	High Speed Spectrum
50 (bps)	400 (bps)
75	600
110	880
134.5	1076
150	1200
300	2400
600	4800
1200	9600
1800	14.4K
2400	19.2K
4800	38.4K
7200	57.6K
9600	76.8K
19.2K	153.6K
38.4K	307.2K
57.6K	460.8K
115.2K	921.6K

INT Vector Enter the interrupt vector I/O address for all ports. I/O address for interrupt vector is from 00000H to 0FFFFH. Interrupt vector is one byte of I/O address, in which each bit is used to indicate the occurrence of interrupt for corresponding port. To use interrupt vector, type in the hardware Interrupt vector I/O address. If not using interrupt vector, type 0 or leave blank as the interrupt vector.

There are two modes for the Smartio C104 Series driver. One is using interrupt vector, the other is not using interrupt vector. Driver employing interrupt vector scheme is supposed to have better performance than employing polling scheme.

5. Press **F10** to save the configuration and exit the utility.


The "Configuration Access Port" for
this board is : 0x180
Use this address to configure the
board next time, and press any key
to exit.

3

Software Installation

In this chapter, the software driver installation, configuration and driver update/removal procedures are described for various operating systems, including Windows NT, Windows 95/98, DOS and Windows 3.x. Before proceeding with the software installation, complete the hardware installation, detailed in previous chapter, “Hardware Installation”.

If it is necessary for you to develop your own applications, please also refer to the next chapter, “Serial Programming Tools”, for programming issues.

Windows NT

Windows NT supports up to **256** serial ports, from **COM1** to **COM256**. To fully integrate the advanced features of Windows NT, multi-process and multi-thread, pure 32-bit Windows NT device drivers are developed for the Smartio C104 Series multiport boards. The driver conforms to Win32 COMM API standard.

- To install the driver for the first time, please go directly to the next section, “Installing Driver”.
- If you already have installed the driver and want to re-configure the board and port, add more boards or delete boards, please refer to the section, “Configuring Board and Port”.
- To update or remove the driver, please go to the section, “Updating Driver” or “Removing Driver”.

Installing Driver

Following is the procedure for installing the Smartio C104 Series driver **for the first time** under Windows NT 4.0.

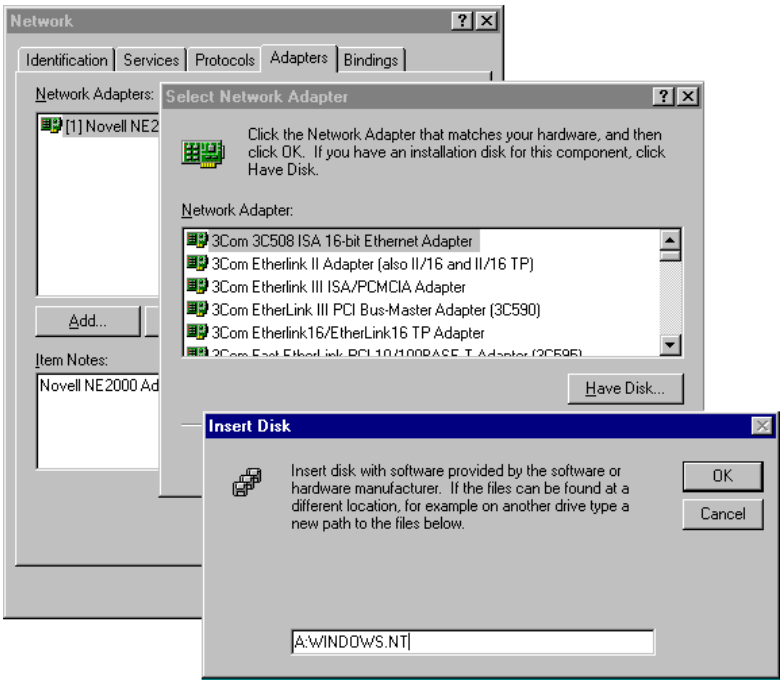
> **Note !** *Make sure the board(s) has(have) already been plugged in the system slot(s) if you are doing **quick** installation.*

1. Please log in NT as **Administrator**.

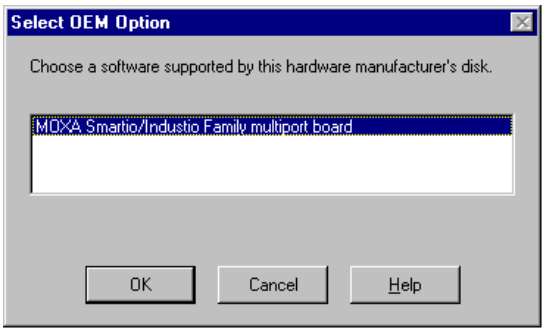
2. Open the [**Control Panel**], click on the [**Network**] icon and select the [**Adapters**] tab.

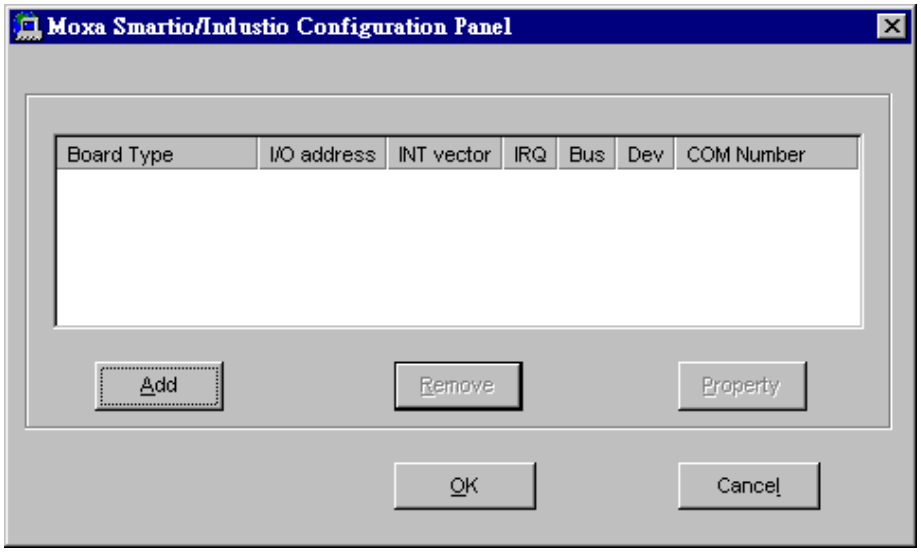
3. Click on the [**Add**] button, then the [**Have Disk...**] button in "Select Network Adapter".

4. Specify the exact path of the driver diskette, **A:\WINDOWS.NT**. Then click [**OK**].

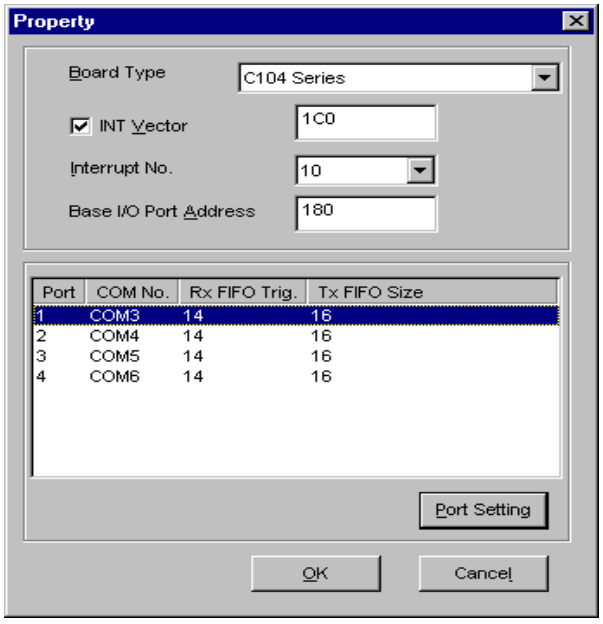

Network
Identification
Services
Protocols
Adapters
Bindings
Network Adapters:
[1] Novell NE2
Add...
Item Notes:
Novell NE2000 Ad
Select Network Adapter
Click the Network Adapter that matches your hardware, and then click OK. If you have an installation disk for this component, click Have Disk.
Network Adapter:
3Com 3C508 ISA 16-bit Ethernet Adapter
3Com Etherlink II Adapter (also II/16 and II/16 TP)
3Com Etherlink III ISA/PCMCIA Adapter
3Com EtherLink III PCI Bus-Master Adapter (3C590)
3Com Etherlink16/EtherLink16 TP Adapter
Have Disk...
Insert Disk
Insert disk with software provided by the software or hardware manufacturer. If the files can be found at a different location, for example on another drive type a new path to the files below.
OK
Cancel
A:\WINDOWS.NT

5. Select "**MOXA Smartio/Industio Family multiport board**" in the "Select OEM Option" dialog box, and then click [**OK**] to enter the "**Moxa Smartio/Industio Configuration Panel**" dialog box to start the installation.



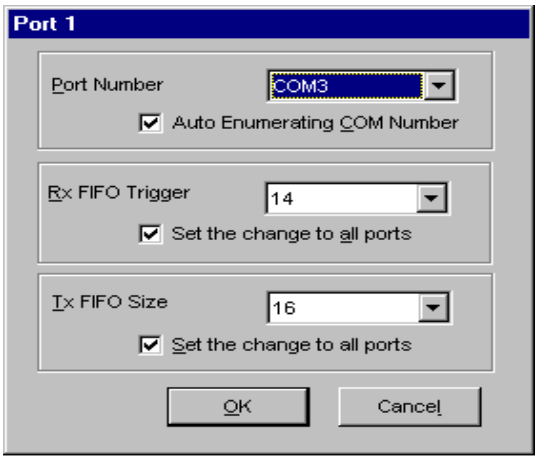


6. In the **"Moxa Smartio/Industio Configuration Panel"** dialog box, click [**Add**] to enter "**Property**" dialog box to add the Smartio C104 Series board. Select the "**C104 Series**" in the "Board Type" field. If necessary, type the desired interrupt vector address, in the "INT Vector" field. Select the desired interrupt number in the "Interrupt No." field. Type the desired base I/O address, in the "Base I/O Port Address" field. All the settings should match settings that are physically set on the board and conflict with no other devices.



Note ! You may go directly to the **step 8** if you need not change any setting.

7. In the "**Property**" dialog box, select the desired port in the port list and click [**Port Setting**] to enter the individual "**Port #**" setting dialog box to change the port COM number mappings or FIFO settings.



- **Port Number**

  You have to set up all the ports of the board with the desired "**COM number**", which should not conflict with other COM number in use. In this "Individual Port Setting" dialog box, you may have two ways to map the physical ports to COM numbers depending on the check box "**Auto Enumerating COM number**".

  If "Auto Enumerating COM Number" is checked and specify the COM number of the first port, subsequent ports are mapped to continuous COM numbers. For instance, if first port is mapped to COM3, then second port is mapped to COM4 sequentially.

  If "Auto Enumerating COM Number" is not checked, specify the COM number for individual port. For instance, the second port can be out of sequence, say COM10, while the first port is mapped to COM3.

- **Rx FIFO Trigger**

  Rx FIFO trigger levels, at 1, 4, 8 or 14 bytes, are available, and the default value is 14 bytes.

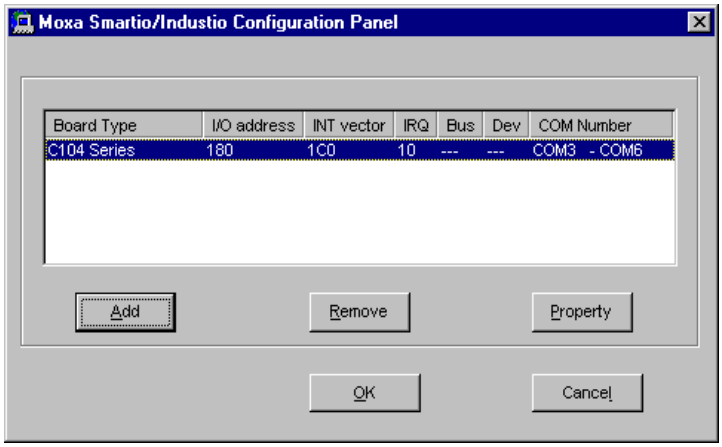
- **Tx FIFO Size**

  Tx FIFO sizes from 1 to 16 bytes are available, and the default value is 16 bytes.

8. Click [**OK**] in the "Port #" and the "Property" dialog boxes to go back to the "Moxa Smartio/Industio Configuration Panel" dialog box.

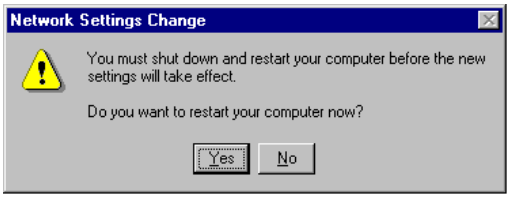
> **Note !** If you need to install more than one board, click [**Add**] and repeat steps **6** to **8** to configure another board. Up to four Smartio C104 Series boards can be installed in a system.

Click [**OK**] to finish the configuration.



9. When configuration is done, click on [**OK**] button in the "Network Settings" dialog box.

10. Restart Windows NT system. The latest configuration will not take effect unless the system restarts.


Network Settings Change
You must shut down and restart your computer before the new settings will take effect.
Do you want to restart your computer now?
Yes
No

> **Note !** The latest configuration will not take effect unless the system restarts.

11. Once the system restarts, you may check the event log issued by the MOXA driver to see if the ports of the board are initialized successfully.

- Enter the [**Administrative**] group, click on the [**Event Viewer**] icon and select [**System Event Log**] to check a message similar to **"MOXA Smartio C104 Series, with first serial port COM3, has been enabled"** for each configured board.

- If an error message similar to **"Cannot find any configured MOXA Smartio C104 Series board!"** appears, refer to the "Troubleshooting" chapter for solutions.

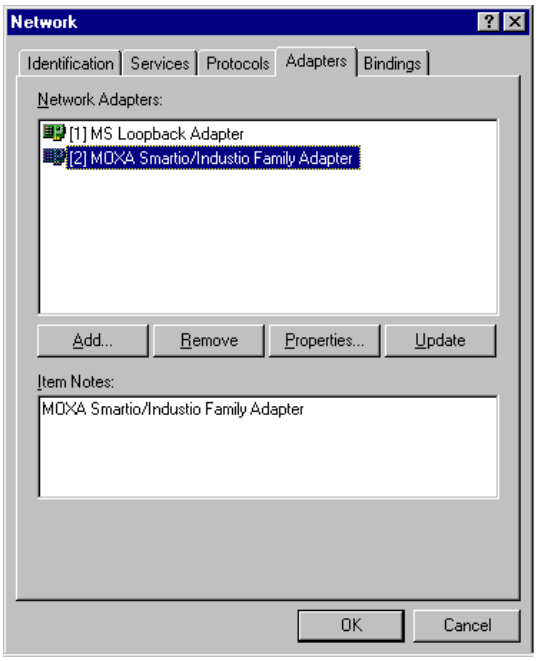
Note ! Once the board and the driver are installed and the driver restarts successfully, you can start to develop applications with the ***PComm*** library (See "Serial Programming Tools" chapter) or the Microsoft Win32 API. You can also execute any ready-made applications, such as ***PComm*** utility Terminal emulator (See "Serial Programming Tools" chapter) or HyperTerminal to transmit/receive data, as well as Remote Access Service to provide dial-up networking capabilities.

Configuring Board and Port

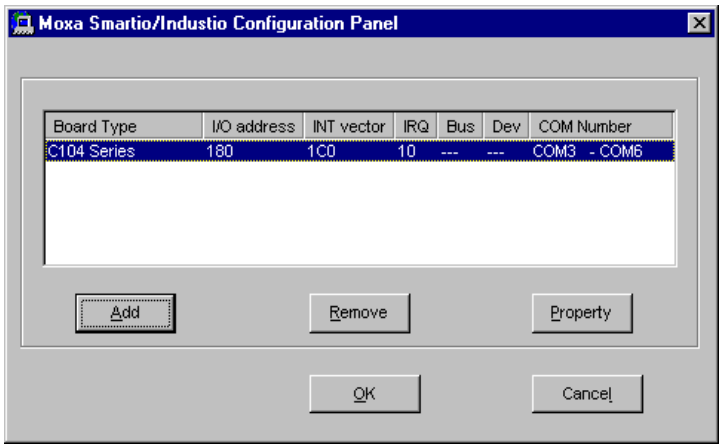
If you already have installed the driver and want to re-configure the ports, please follow this procedure.

1. In the [**Control Panel**], click on the [**Network**] icon and select the [**Adapters**] tab.

2. Select **"MOXA Smartio/Industio Family Adapter"** in "Network Adapters".



3. Click on the [**Property**] button to open the **"Moxa Smartio/Industio Configuration Panel"** dialog box. Please see steps 6-10 in the previous section, "Installing Driver", for more details.



In this configuration panel, you may:

- Click [**Property**] to enter "Property" dialog box to configure the selected board with the correct "COM Number", "INT Vector", "Interrupt no" and "Base I/O Port Address". Please see **steps 6 to 8** in the previous section, "Installing Driver", for more details, except that the "Board Type" field is not supposed to be changed.

- Click [**Add**] to add one more board that is not yet configured in the system. Please see **steps 6 to 8** in the previous section, "Installing Driver", for more details.

- Click [**Remove**] to remove the board currently selected from the configured board list.

- Click [**OK**] to confirm the configuration changes you made.

- Click [**Cancel**] to leave the dialog with the configuration unchanged.

Updating Driver

To update the driver for the Smartio C104 Series board, simply remove the driver, as described in the next section, and reinstall it as detailed in section, **"Installing Driver"**.

Removing Driver

To remove the driver for the Smartio C104 Series board,

1. Open the [**Control Panel**], click on the [**Network**] icon, and select the [**Adapters**] tab.
2. Select **"MOXA Smartio/Industio Family Adapter"** in the adapter list, then click on the [**Remove**] button and the [**OK**] button to remove the driver.
3. Restart the system to activate the new configuration.

Windows 95/98

Windows 95/98 supports up to **128** serial ports, from **COM1** to **COM128**. To fully integrate the advanced features of Windows 95/98, multi-process and multi-thread, pure 32-bit Windows 95/98 virtual device port drivers (VxD) compliant with communication drivers (VCOMM) are developed for the Smartio C104 Series and other MOXA multiport boards. The drivers conform to the Win32 COMM API standard.

- To install the driver for the first time driver, please go directly to the section, "Installing Driver".
- If you already have installed the driver and want to re-configure the board and port, add more boards or delete boards, please refer to the section, "Configuring Board and Port".
- To update or remove driver, please go to the sections, "Updating Driver" and "Removing Driver".

Installing Driver

Up to four Smartio C104 Series boards can be installed together as long as the I/O addresses and IRQ number resources are sufficient and available in a system.

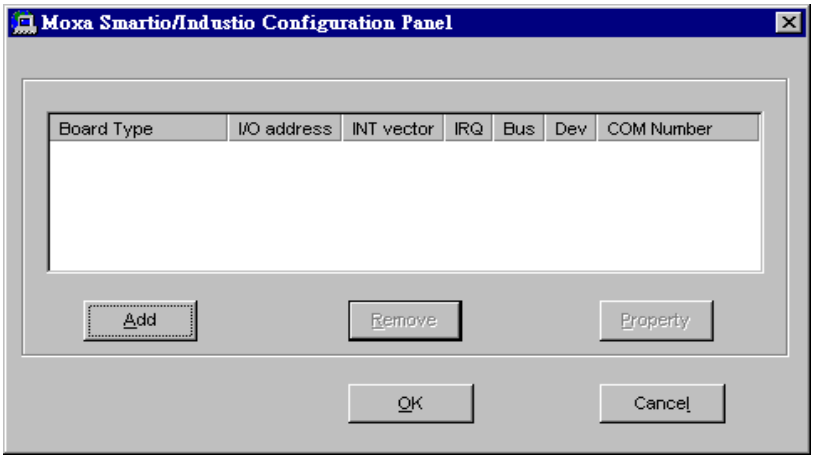
The following is the procedure for installing Smartio C104 Series **for the first time** under Windows 95/98:

1. Run **Setup95.exe** in the driver diskette.

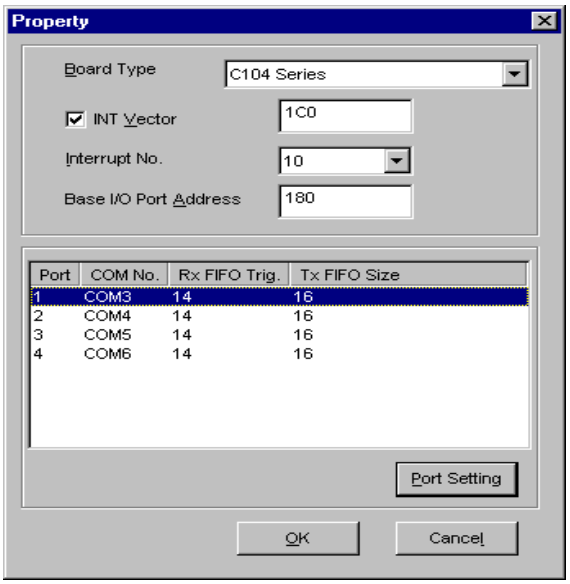
2. Click on [**Next>**] button in the "Welcome ..." message dialog box. And then click on [**Next>**] button in the "Ready ..." message dialog.

3. Click on [**Finish**] button in the "Complete ..." message dialog to enter the configuration panel.

4. The **"Moxa Smartio/Industio Configuration Panel"** dialog will pop up for you to configure the board and ports.

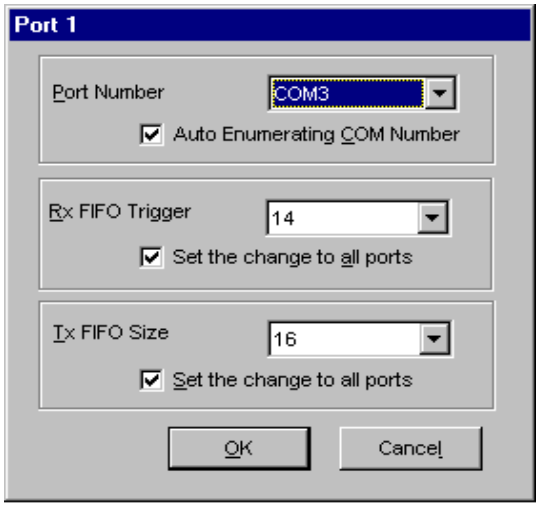


5. In the "**Moxa Smartio/Industio Configuration Panel**" dialog box, click [**Add**] to enter "**Property**" dialog box to add the Smartio C104 Series board. Select the **"C104 Series"** in the "Board Type" field. If necessary, type the desired interrupt vector address, in the "INT Vector" field. Select the desired interrupt number in the "Interrupt No." field. Type the desired base I/O address, in the "Base I/O Port Address" field. All the settings should match settings that are physically set on the board and conflict with no other devices.



Note ! Go directly to the **step 7** if you need not change any setting.

6. In the "**Property**" dialog box, select the desired port in the port list and click [**Port Setting**] to enter the individual "**Port #**" setting dialog box to change the port COM number mappings or FIFO settings.



- **Port Number**

  You have to set up all the ports of the board with the desired "**COM number**", which should not conflict with other COM number in use. In this "Individual Port Setting" dialog box, you may have two ways to map the physical ports to COM numbers depending on the check box "**Auto Enumerating COM number**".

  If "Auto Enumerating COM Number" is checked and specify the COM number of the first port, subsequent ports are mapped to continuous COM numbers. For instance, if first port is mapped to COM3, then second port is mapped to COM4 sequentially.

  If "Auto Enumerating COM Number" is not checked, specify the COM number for individual port. For instance, the second port can be out of sequence, say COM10, while the first port is mapped to COM3.

- **Rx FIFO Trigger**

  Rx FIFO trigger levels, at 1, 4, 8 or 14 bytes, are available, and the default value is 14 bytes.

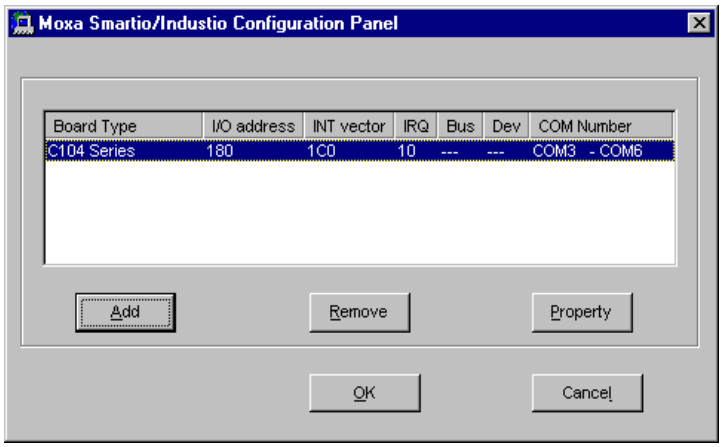
- **Tx FIFO Size**

  Tx FIFO sizes from 1 to 16 bytes are available, and the default value is 16 bytes.

7. Click [**OK**] in the "Port #" and the "Property" dialog boxes to go back to the "Moxa Smartio/Industio Configuration Panel" dialog box.

> **Note !** If you need to install more than one board, click [**Add**] and repeat steps **5** to **7** to configure another board. Up to four Smartio C104 Series boards can be installed in a system.

Click [**OK**] to finish the configuration.



8. Restart Windows 95/98 system**.**

MOXA Smartio/Industio Configuration Panel
You must restart your computer before the new settings will take effect. Do you want to restart your computer now?
是(Y)
否(N)

> **Note !** The latest configuration will not take effect unless the system restarts.

9. When system restarts, all the error conditions of the board will be popped up onto the screen if any. Otherwise, everything should be fine.

If error message like "**Smartio C104 Series (CAP=0x0180, port 1=COM3): Board is not found**" appears, refer to chapter, "Troubleshooting", for solutions.

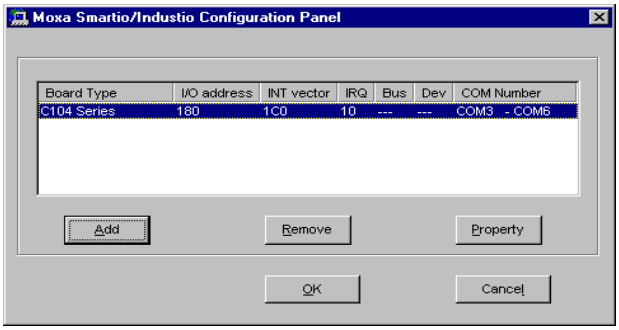
> **Note !** Once the board and the driver are installed and the driver restarts successfully, you can start to develop applications with the ***PComm*** library (See "Serial Programming Tools" chapter) or the Microsoft Win32 API. You can also execute any ready-made applications, such as ***PComm*** utility Terminal emulator (See "Serial Programming Tools" chapter) or HyperTerminal to transmit/receive data, as well as Remote Access Service to provide dial-up networking capabilities.

Configuring Board and Port

If you already have installed the driver and want to re-configure the Smartio C104 Series board and ports, add more boards or delete boards under Windows 95/98, the following is the procedure for you.

1. Click on the Taskbar [**Start**] button, then select [**Programs**] menu, then [**MOXA Utilities**] menu and then [**Moxa Smartio/Industio Configuration Panel**] icon.

2. The Smartio/Industio configuration panel will be popped up. Please see steps 5-7 in the previous Section "Installing Driver" for more details.

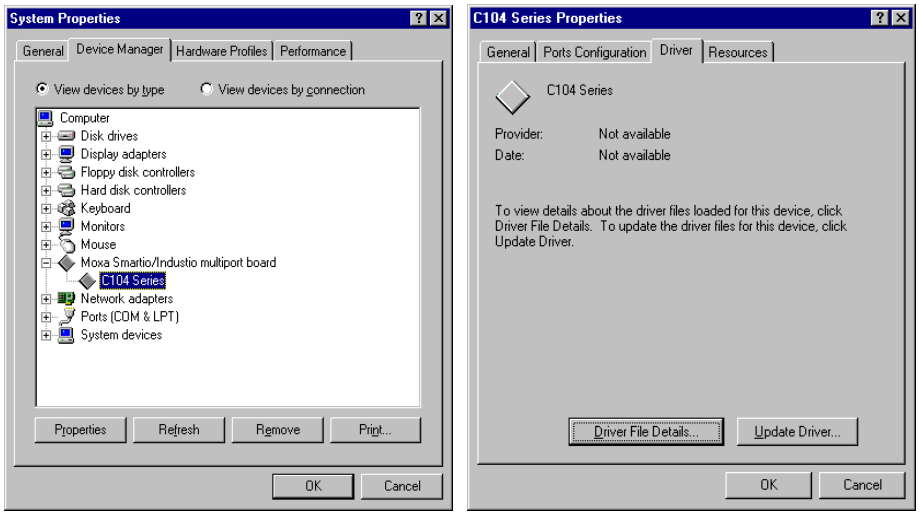


In this configuration panel, you may:

- Click [**Property**] to enter "Property" dialog box to configure the selected board with the correct "COM Number", "INT Vector", "Interrupt no" and "Base I/O Port Address". Please see **steps 5 to 7** in the previous section, "Installing Driver", for more details, except that the "Board Type" field is not supposed to be changed.
- Click [**Add**] to add one more board that is not yet configured in the system. Please see **steps 5 to 7** in the previous section, "Installing Driver", for more details.
- Click [**Remove**] to remove the board currently selected from the configured board list.
- Click [**OK**] to confirm the configuration changes you made.
- Click [**Cancel**] to leave the dialog with the configuration unchanged.

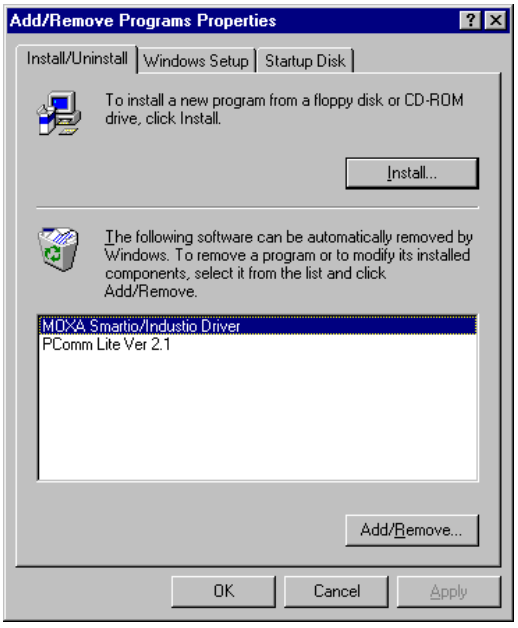
Updating Driver

Open [**Control Panel**] icon, and then [**System**] icon, and then select [**Device Manager**] tab. Then select and open the **"MOXA Smartio/Industio multiport board"** option and then select the "**C104 Series**". Click on [**Properties**] button and then select [**Driver**] tab and then click on [**Update Driver**] button.



Removing Driver

Open [**Control Panel**] icon, and then [**Add/Remove Programs**] icon, and then select [**Install/Uninstall**] tab. Then select and open the **"MOXA Smartio/Industio Driver"** option and then enter [**OK**] to remove the driver.


Add/Remove Programs Properties
Install/Uninstall
Windows Setup
Startup Disk
To install a new program from a floppy disk or CD-ROM drive, click Install.
Install...
The following software can be automatically removed by Windows. To remove a program or to modify its installed components, select it from the list and click Add/Remove.
MOXA Smartio/Industio Driver
PComm Lite Ver 2.1
Add/Remove...
OK
Cancel
Apply

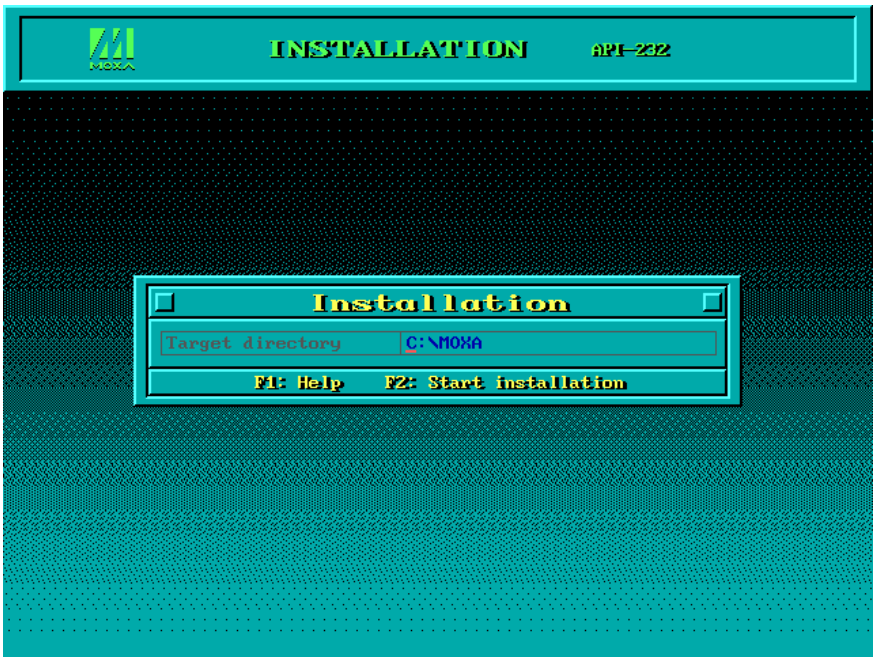
DOS

MOXA DOS API-232 is a software package that assists users to develop and/or debug programs for serial communications. This section will show you how to install the package, how to setup up the driver, and how to load or unload driver.

For details of the serial programming (API-232 Library) and utilities, please refer to the next chapter, “Serial Programming Tools”.

Installing Driver

Run the installation program, **DOSINST.EXE,** in the DOS/Windows 3.x driver diskette. Specify the target API-232 directory (e.g. **C:\MOXA**) where software driver will be copied. Press **F2** to start the installation.



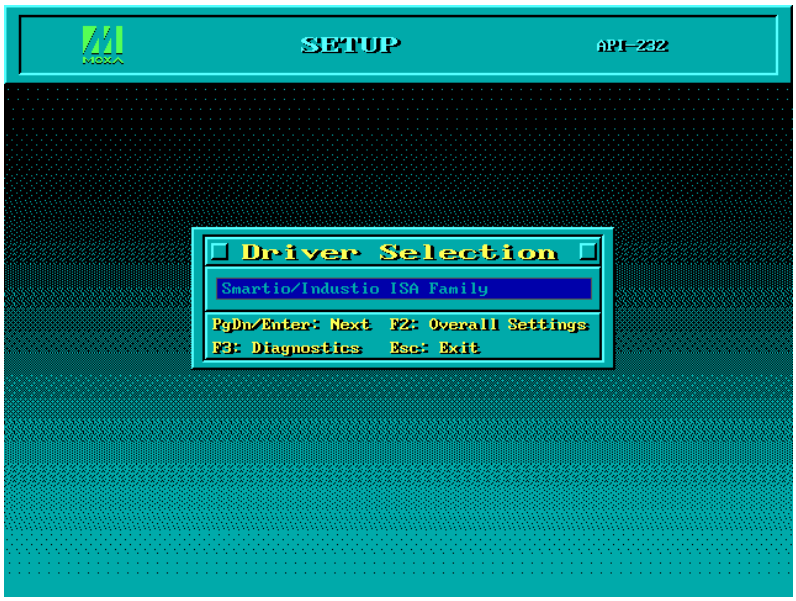
After installation is complete, you will be prompted to proceed running setup program. It is strongly recommended to do so.

INSTALLATION
API-232
Installation complete, 57 files copied.
After leaving this program, you have to run
C:\MOXA\BIN\SETUP.EXE
program to setup board & driver initial values.
Do you want to run SETUP.EXE now ?(Y/N)

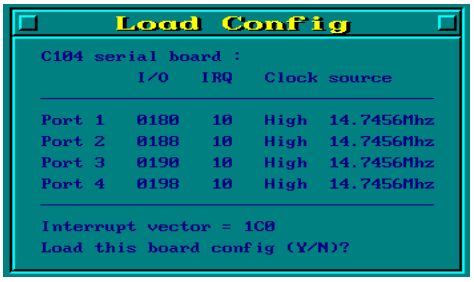
Driver Setup

The following are steps for setting up the Smartio C104 Series driver. Note that it is not intended to illustrate all the convenient functions of the setup programs when configuring the boards. Please refer to the F1 on-line help instructions as running setup program.

1. Run the setup program, **BIN\SETUP.EXE**, in the API-232 directory. Select "**Smartio/Industio ISA Family**" in the "Driver Selection" dialog box.

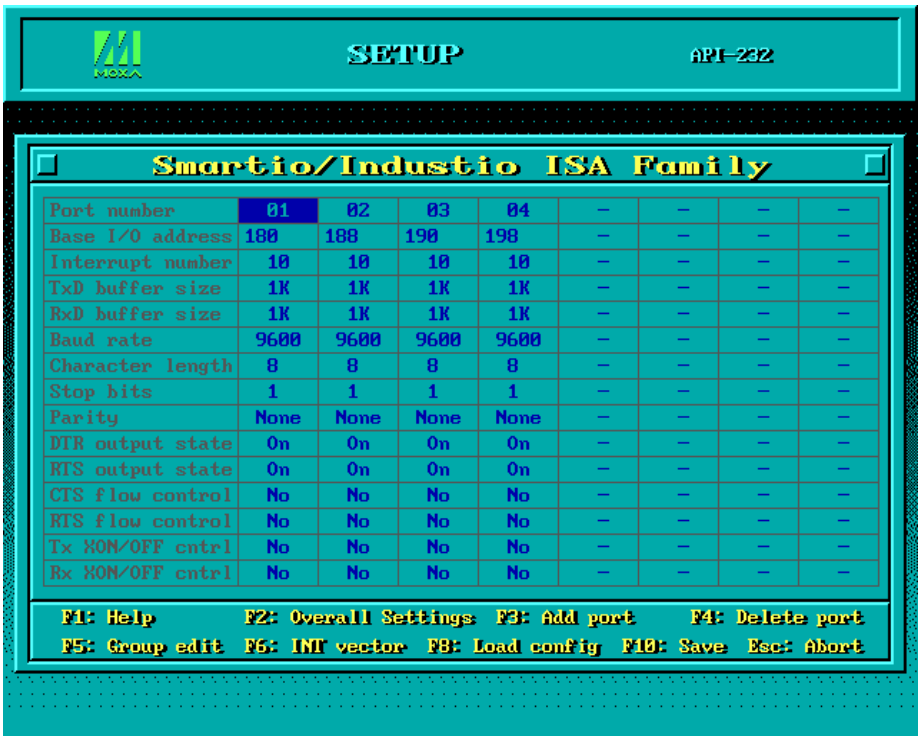


2. Press **Enter** to pop up the SETUP dialog box. In the SETUP dialog box, Press **F8** to specify the **CAP Address** and press **ENTER** and then type **Y** (**YES**) to load the configuration of the board to be setup.


Load Config
C104 serial board :
I/O IRQ Clock source
Port 1 0180 10 High 14.7456Mhz
Port 2 0188 10 High 14.7456Mhz
Port 3 0190 10 High 14.7456Mhz
Port 4 0198 10 High 14.7456Mhz
Interrupt vector = 1C0
Load this board config (Y/N)?

3. Now the configuration of the desired Smartio C104 Series board will be shown along with other default settings, such as port number, buffer size, etc.

> **Note !** Up to now you have completed the setup for Smartio C104 Series board. You may skip this step and go directly to the next **step 5** if you need not change any setting or configure any board.


SETUP
API-232
Smartio/Industio ISA Family
Port number 01 02 03 04 – – – –
Base I/O address 180 188 190 198 – – – –
Interrupt number 10 10 10 10 – – – –
TxD buffer size 1K 1K 1K 1K – – – –
RxD buffer size 1K 1K 1K 1K – – – –
Baud rate 9600 9600 9600 9600 – – – –
Character length 8 8 8 8 – – – –
Stop bits 1 1 1 1 – – – –
Parity None None None None – – – –
DTR output state On On On On – – – –
RTS output state On On On On – – – –
CTS flow control No No No No – – – –
RTS flow control No No No No – – – –
Tx XON/OFF cntrl No No No No – – – –
Rx XON/OFF cntrl No No No No – – – –
F1: Help F2: Overall Settings F3: Add port F4: Delete port
F5: Group edit F6: INT vector F8: Load config F10: Save Esc: Abort

You may now enter/modify each port's configuration. These displayed values are the port initial values as driver is loaded.

Legend:

Some noticeable fields and functions are explained below.

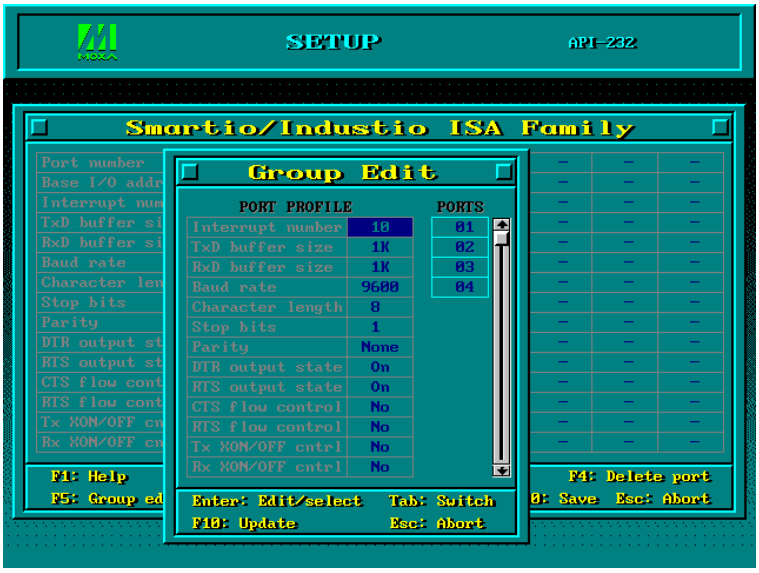
Port number: This is actually the port ID of each port. The application software will refer to the port by its port number (ID). Duplicated port number is not allowed. That is, each MOXA serial port is referred to as port number in terms of serial programming.

You may map the port number range to the one you prefer between 0 and 255 as long as no port number overlapping condition or port number undefined condition occurs. Generally, you should take the convenience of programming into consideration when specifying the port numbers for the board.

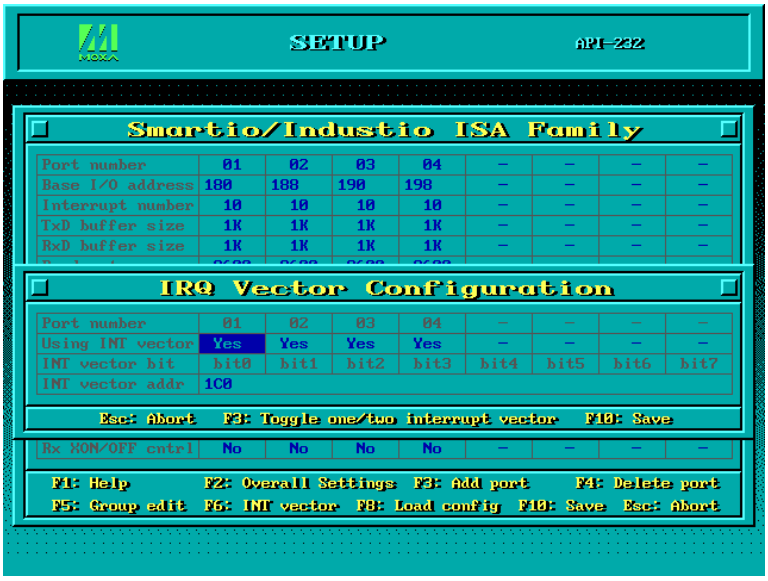
TxD buf size: The transmission (output) buffer allocated in the system for each port.

RxD buf size: The receiving (input) buffer allocated in the system for each port.

F5: Group Edit: This is a convenient function that helps you edit the configuration of several ports at one time as a group.



F6: INT vector: This is to set interrupt vector for each port. You can set this feature to "**Yes**" (default) and gain best performance for the board.


SETUP
API-232
Smartio/Industio ISA Family
Port number 01 02 03 04 – – – –
Base I/O address 180 188 190 198 – – – –
Interrupt number 10 10 10 10 – – – –
TxD buffer size 1K 1K 1K 1K – – – –
RxD buffer size 1K 1K 1K 1K – – – –
IRQ Vector Configuration
Port number 01 02 03 04 – – – –
Using INT vector Yes Yes Yes Yes – – – –
INT vector bit bit0 bit1 bit2 bit3 bit4 bit5 bit6 bit7
INT vector addr 1C0
Esc: Abort F3: Toggle one/two interrupt vector F10: Save
Rx XON/XOFF cntrl No No No No – – – –
F1: Help F2: Overall Settings F3: Add port F4: Delete port
F5: Group edit F6: INT vector F8: Load config F10: Save Esc: Abort

4. To setup one more board, please follow the same instructions **2** to **3** described above.

5. Press **F10** to save the latest configuration and exit the SETUP program.

Loading Driver

Having completed the setup, you can load the driver, **"BIN\SER-DRV.EXE"**, at the DOS prompt. The driver will detect the Smartio C104 Series board automatically. If the board(s) is(are) detected, a message similar to below will show:

API-232 Version 3.5
Universal 2/4/8 serial ports Communication Driver
Setup driver …
Device driver setup O.K.

It means the Smartio C104 Series driver is installed properly. At this point, you are ready to execute application that supports API-232 functions, or start developing applications using API-232 library.

If something went wrong, for instance, the board does not match the configuration or the board is missing, the screen will show a message like:

```
API-232 Version 3.5
Universal 2/4/8 serial ports Communication Driver
Setup driver …
None serial port found!!
```

It means the Smartio C104 Series driver is not installed properly. Please refer to chapter, “Troubleshooting”, for possible reasons and solutions.

Unloading Driver

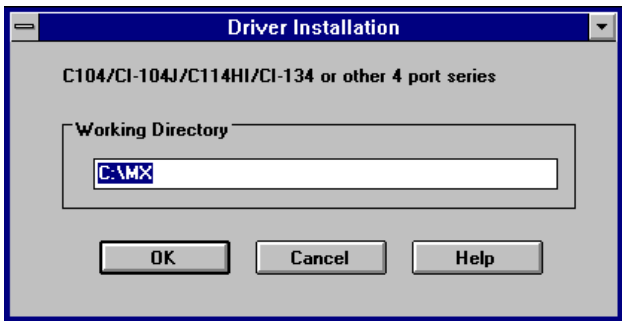
To unload (release) the Smartio C104 Series driver from memory, type **“SER-DRV/Q”** at the DOS prompt

Windows 3.x

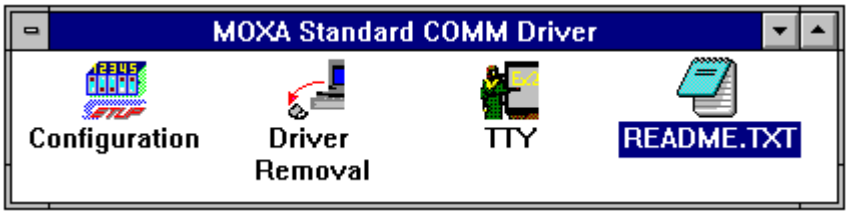
In this chapter, driver installation, configuration and removing procedure is described. Utility, **TTY**, is explained in chapter, “Serial Programming Tools”, which is good for terminal emulation. Related issues such as driver removal, baud rate settings, programming and existing applications are also stated.

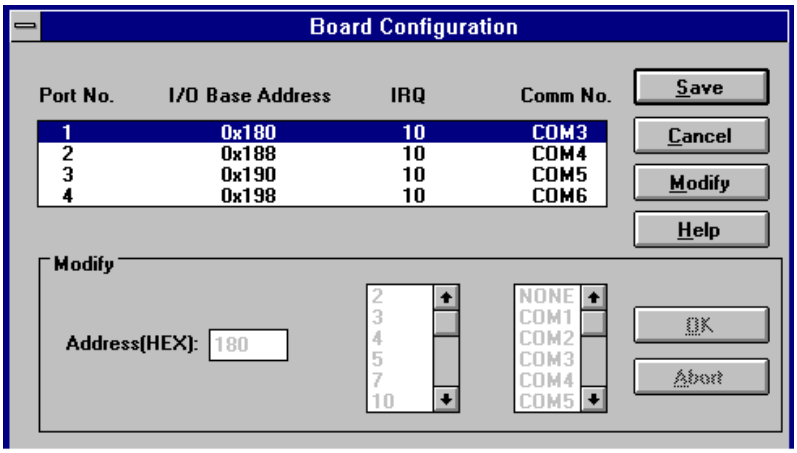
Installing Driver

1. Run **WININST.EXE** in the DOS/Windows 3.x driver diskette, click [**OK**] in the "Driver Installation" dialog box to install the driver.

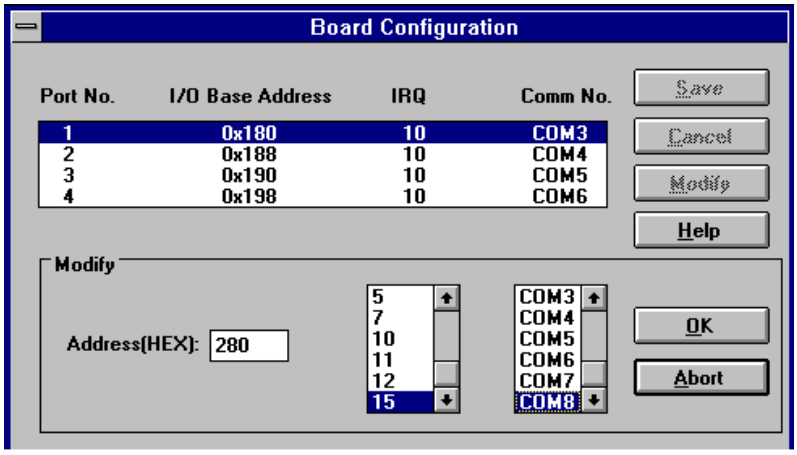


2. When installation completed the program group "MOXA Standard COMM Driver" and "Board Configuration" dialog boxes appear. If the default settings are what you desired, click [**Save**] to save the configuration and exit.





If you need to modify the settings, click [**Modify**], type in the desired I/O address in the "Address" field and select the desired IRQ and COM number. Then click [**OK**] and [**Save**] to save the new configuration and exit.

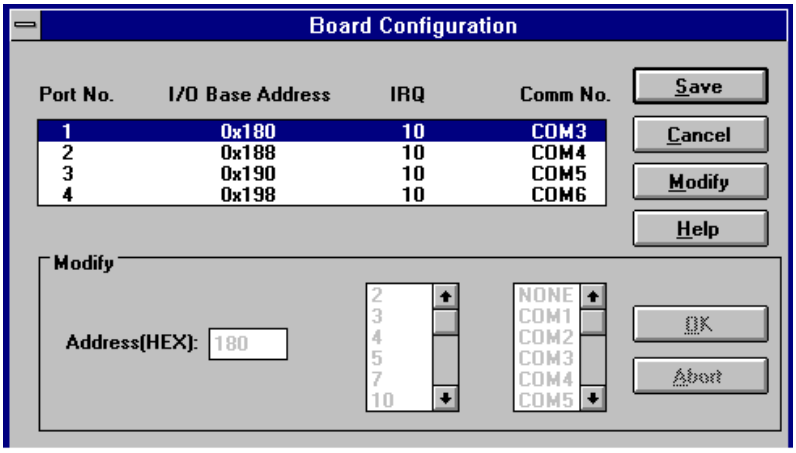


3. When configuration completed, you have to quit and restart Windows so that the changes you made will take effect.

Board Setup
You have to quit and restart Windows so that the changes you made will take effect.
Restart now
Don't restart now

Configuring Driver

The configuration program, **Configuration**, in the "MOXA Standard COMM Driver" program group, has the easiest way to configure the 4 ports of Smartio C104 Series. Either from COM1 to COM4, from COM2 to COM5, from COM3 to COM6, from COM4 to COM7, from COM5 to COM8 or from COM6 to COM9, depending on user's need. Normally COM1 is used by mouse and to fully use the 4 MOXA ports, thus COM3 to COM6 is recommended. In this case, the original COM1 and COM2 on PC will be still available.



Due to the limitations of Windows 3.x operating system itself, **only up to 9 COM ports** are supported, i.e., COM1 to COM9. Hence, Smartio C104 Series with 4 ports or other 4 port non-intelligent boards, maximum 6 ports is supported if the existing standard COM ports (COM1 and COM2) are included.

Removing Driver

The program, **Driver Removal**, in the "MOXA Standard COMM Driver" program group is provided to remove the installed driver from the Windows.

Baud Rate Settings

For those Smartio C104 Series boards configured as **High Speed Spectrum**, the real working speed is equal to **8 times** of the displayed speed. For example, a port, if set to Normal Speed Spectrum with 38.4 Kbps, will work at 38.4 Kbps for sure; while a port, if set to High Speed Spectrum with shown speed 38.4 Kbps, will actually work at 307.2 Kbps (38.4 Kbps ¡ 8Ñ. This is applicable to Moxa-provided utility, such as CONFIG and TTY, existing applications and programming, which are described in later chapter.

4

Serial Programming Tools

Moxa supports easy but powerful serial programming library and communication troubleshooting utilities under Windows NT, Windows 95/98, DOS and Windows 3.x. You will save greatly the developing time, using MOXA Serial Programming Tools.

The following sections will details the installation, the library and the utilities for various platforms.

Windows NT and Windows 95/98

PComm, the professional serial comm tool for PC, is a software package under **Windows NT and Windows 95/98**, which consists of powerful serial communication library for easy programming in most popular languages, useful utilities such as diagnostic, monitor and terminal emulator, illustrative example programs and comprehensive on-line documents.

The serial communication library is useful for developing a system for data communication, remote access, data acquisition or industrial control in the Windows NT and Windows 95/98 environment, which offers an easier solution compared with the more complex Windows Win32 COMM API.

Installation

To install ***PComm***, please run **\Setup.exe** in the diskette. Note that ***PComm*** diagnostic and monitor utilities are for MOXA boards only. MOXA Windows NT or Windows 95/98 device driver as well as MOXA board are required. The driver are installed separately and detailed in Chapter “Software Installation”.

PComm Programming Library

The serial communication library is to assist users to develop programs for serial communications **for any COM port** complying with Microsoft Win32 API. It can ease the implementation of multi-process and multi-thread serial communication programs and hence greatly reduce the developing time.

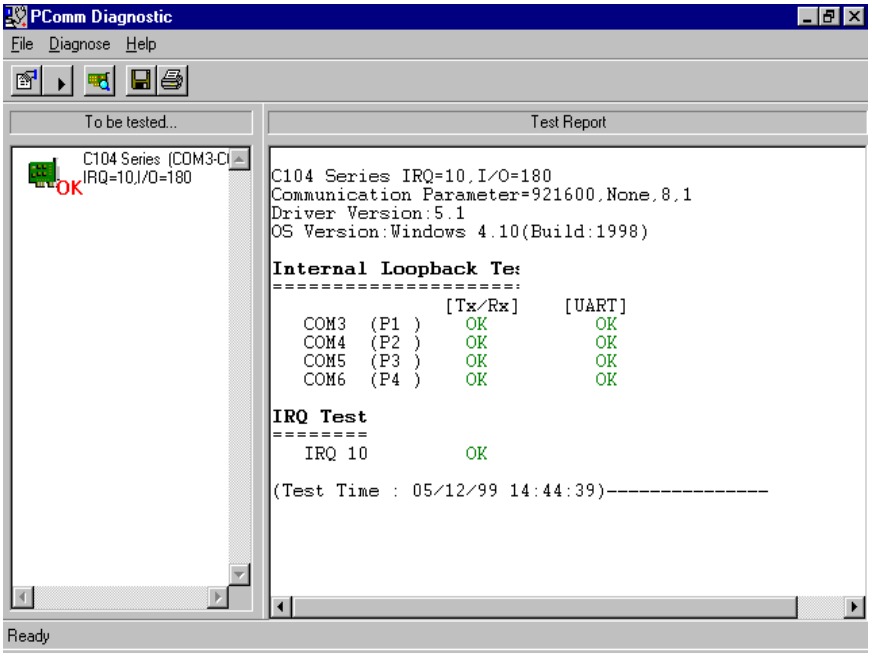
For complete library function description and example programs for Visual C++, Visual Basic and Delphi, please see help file and example programs in ***PComm*** directory for more details.

Utilities

The followings are short descriptions of each utility. For details, please see **on-line help** as running utilities.

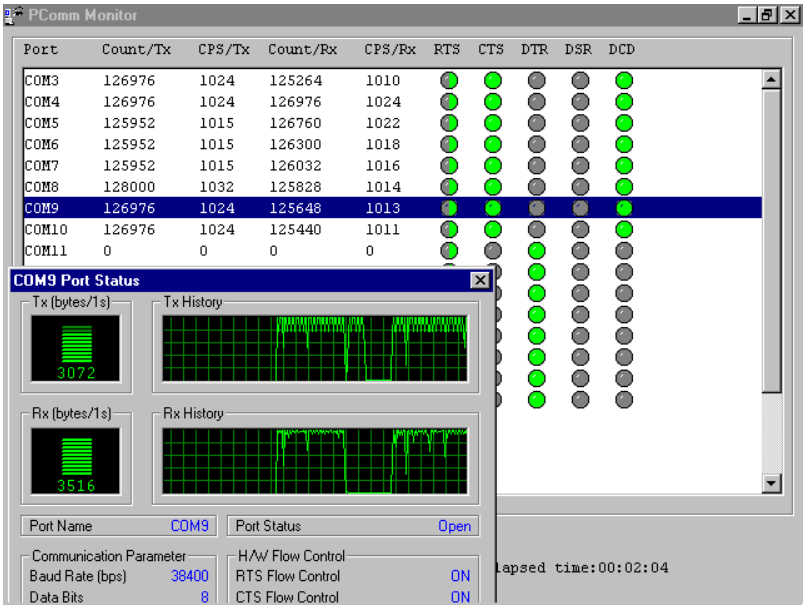
Diagnostic (for MOXA boards only)

A convenient diagnostic program provides internal and external testing, such as IRQ, TxD/RxD, UART, CTS/RTS, DTR/DSR, DTR/DCD testing, etc., for the MOXA boards and ports to verify correct operation of both the software and hardware.



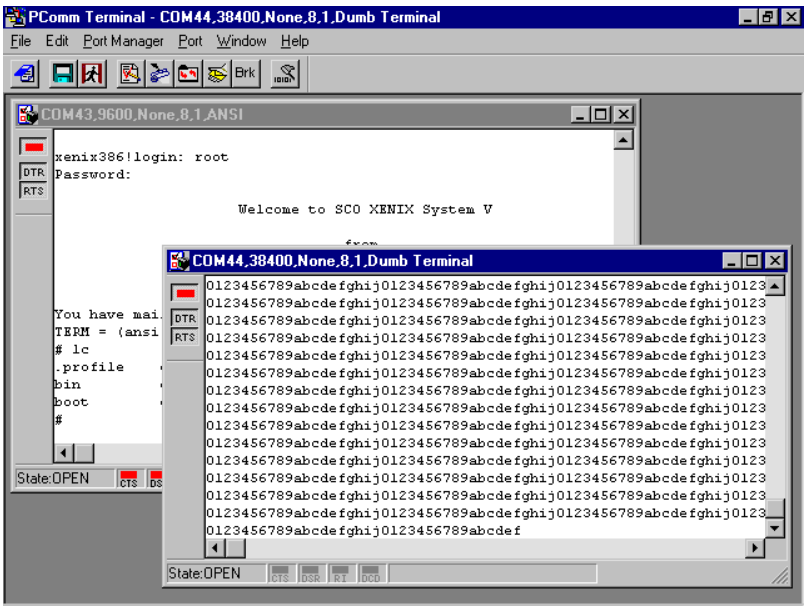
Monitor (for MOXA boards under Windows NT Only)

A useful port status monitoring program allows you to watch the selected MOXA COM ports' data transmitting/receiving throughput and communication line status which are updated and displayed on the screen at every time interval. In addition, you may click on one of the specific displayed port in order to see the current communication parameters and status of that port.



Terminal Emulator

The Terminal Emulator features multi-windows and supports terminal types of VT100 and ANSI. You can transfer data interactively, send pattern periodically or transfer file using ASCII, XMODEM, YMODEM, ZMODEM and KERMIT protocols.



DOS

Installation

API-232 Library is the professional serial programming tool for DOS. It is installed automatically along with the MOXA DOS drivers. The installation is detailed in Chapter “Software Installation”.

DOS API-232 Library

DOS API-232 library supports languages like Microsoft C, Turbo C, Macro Assembly, QuickBasic, Turbo Pascal, Clipper, etc. Sample programs for each supported language are included, and placed in the sub-directory **..\EXAMPLE\% language** of the API-232 directory.

In addition, for DOS C language only, there are also Modem Control and File Transfer library available, supporting Hayes compatible modem control as well as ASCII, KERMIT, XMODEM, YMODEM and ZMODEM file transfer protocol functions.

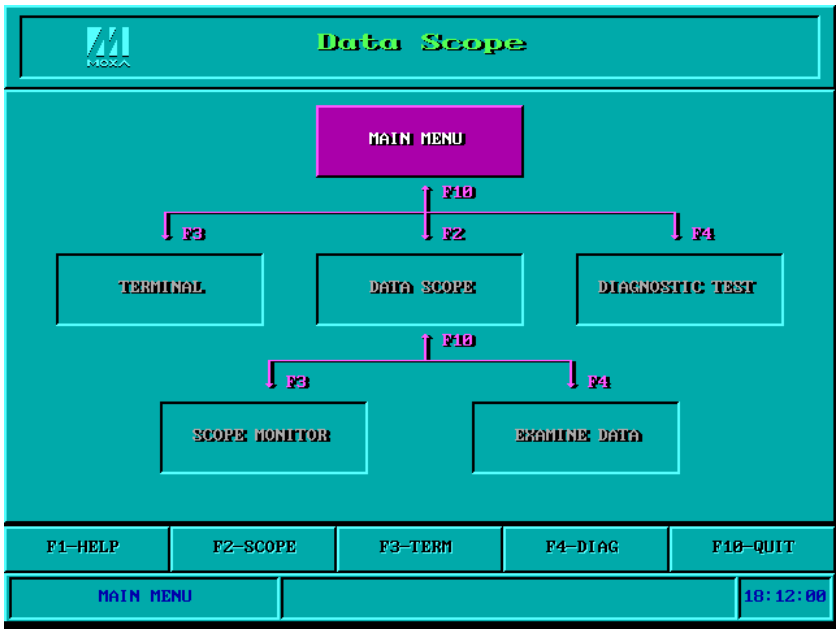
For complete API-232 function description, please see file **API-232.TXT** in the API-232 directory for more details.

Utilities

There are two utilities available for DOS: Data Scope and Diagnose, which are detailed below.

Data Scope

The Data Scope, **BIN\SCOPE.EXE**, is a suite of utility programs that can help users with system troubleshooting and serial communication debugging.



There are three major functions in Data Scope utility:

1. The **Data Scope utility** offers transparent monitoring of serial communication lines and allows data to be streamed to disk storage for later analysis.

2. The **TTY terminal emulation utility** allows user to view the signal status and transfer data interactively or files using ASCII, XMODEM, YMODEM, ZMODEM and KERMIT protocols.

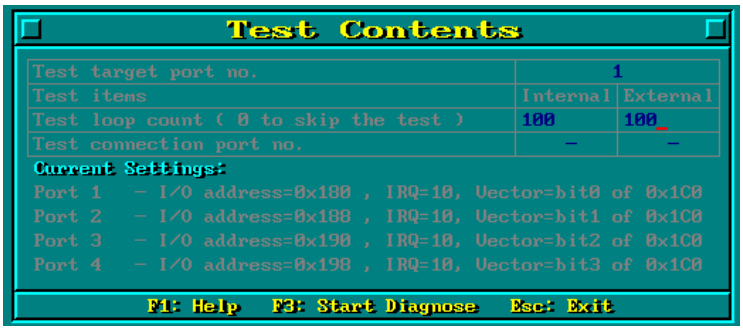
3. The **Diagnostic test utility** provides port connection test with two MOXA ports connected via a properly wired cable.

Please see **on-line help** as running BIN\SCOPE.EXE for more usage and capability information.

Diagnose

The Diagnose, **BIN\DIAGNOSE.EXE**, is a utility that can help users to diagnose the hardware condition of each port of the selected board. See on-line help for more details.

Before executing it, please remove the Moxa driver in advance via executing "Mxdrv/Q" if the Moxa driver is running in the background.


Test Contents
Test target port no. 1
Test items Internal External
Test loop count (0 to skip the test) 100 100
Test connection port no. - -
Current Settings:
Port 1 - I/O address=0x180 , IRQ=10, Vector=bit0 of 0x1C0
Port 2 - I/O address=0x188 , IRQ=10, Vector=bit1 of 0x1C0
Port 3 - I/O address=0x190 , IRQ=10, Vector=bit2 of 0x1C0
Port 4 - I/O address=0x198 , IRQ=10, Vector=bit3 of 0x1C0
F1: Help F3: Start Diagnose Esc: Exit

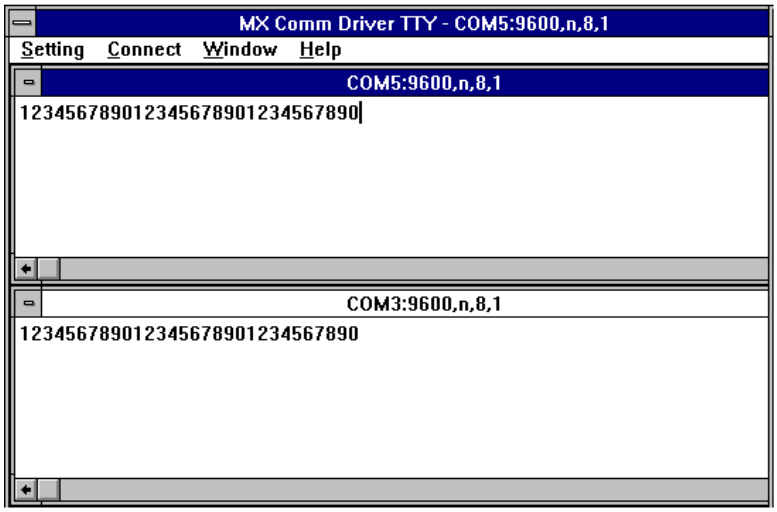
Windows 3.x

Windows COMM API Library (Win16)

MOXA Windows-compatible COMM Driver supports **Microsoft Windows COMM API** such as OpenComm(), ReadComm(), WriteComm(), etc. It supports any language conforming to the Windows COMM API like Microsoft C, Borland C, Visual C, Visual Basic, Delphi, etc. Sample programs for only Microsoft C, Borland C and Visual Basic are supported. For other languages' sample programs, please refer to the language-provided communication example programs.

Utility

The utility, **TTY**, in the "MOXA Standard COMM Driver" program group is intended to help users monitor and debug RS-232 communications under Windows 3.x which can manipulate ports from COM1 to COM9. It is just a simplest example program which can send and receive data after each port opened with selected communication parameters. Multiple windows for ports simultaneously are available for a demonstration of multitasking feature of Windows 3.x. The Windows-provided application, **Terminal**, can only make use of COM1 to COM4 which is obviously a restriction.



Existing Applications

Many Windows software packages, such as pcANYWHERE, LabView, FIX, WinFax Pro, Fax Server, PROCOMM PLUS, LapLink, etc. can access the Smartio C104 COM ports directly since these applications follow the Microsoft Windows COMM API.

5

Connection Cable and Cable Wiring

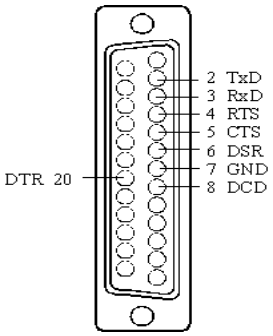
In serial data communications, the term **DTE** is for Data Terminal Equipment like PC COM1/2, serial printer and terminal. The term **DCE** is for Data Communication Equipment like modem.

RS-232 Cable Wiring

The followings are pin assignments for various connection options:

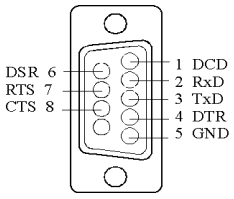
Smartio C104 Series
DB25 Male (Opt 4C)

2	TxD
3	RxD
4	RTS
5	CTS
6	DSR
7	GND
8	DCD
20	DTR

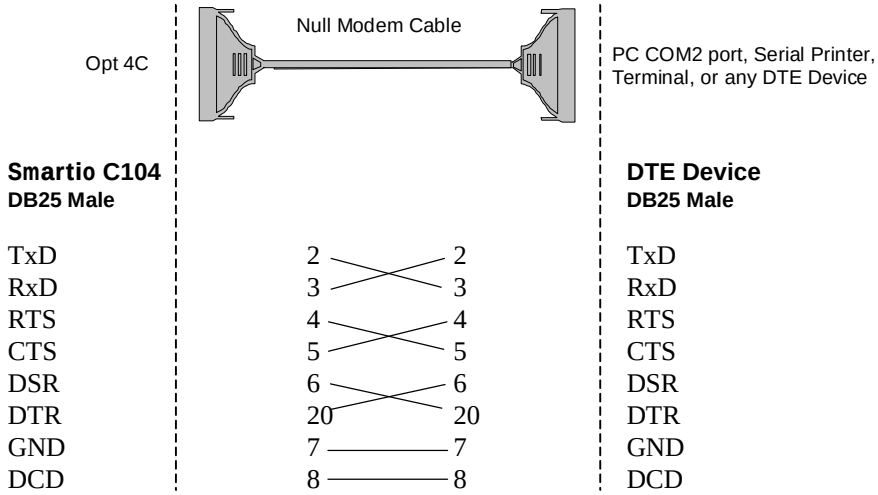


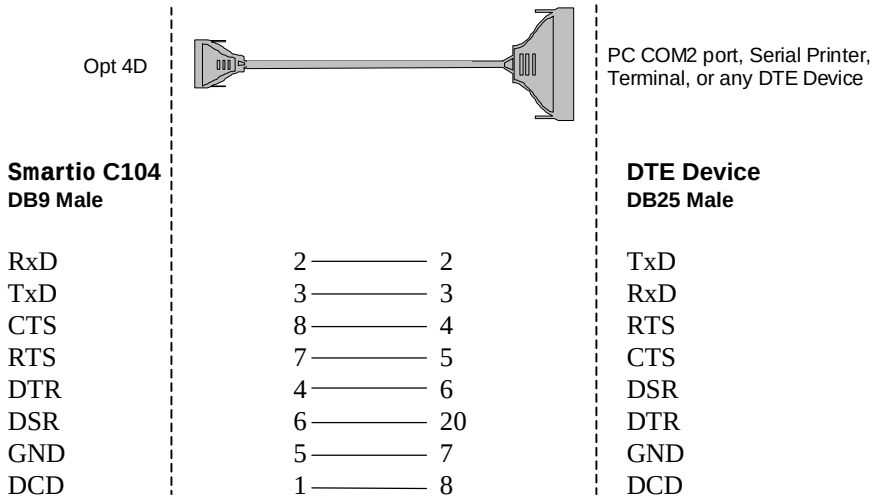
Smartio C104 Series
DB9 Male (Opt 4D)

1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS

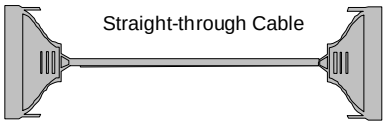


Type 1: To connect Smartio C104 Series to a DTE device.





Type 2: To connect Smartio C104 Series to a DCE device.



Opt 4C

Modem,
or any DCE Device

Smartio C104 **DB25 Male**		**DCE Device** **DB25 Female**
TxD	2 —— 2	RxD
RxD	3 —— 3	TxD
RTS	4 —— 4	CTS
CTS	5 —— 5	RTS
DSR	6 —— 6	DTR
DTR	20 —— 20	DSR
GND	7 —— 7	GND
DCD	8 —— 8	DCD

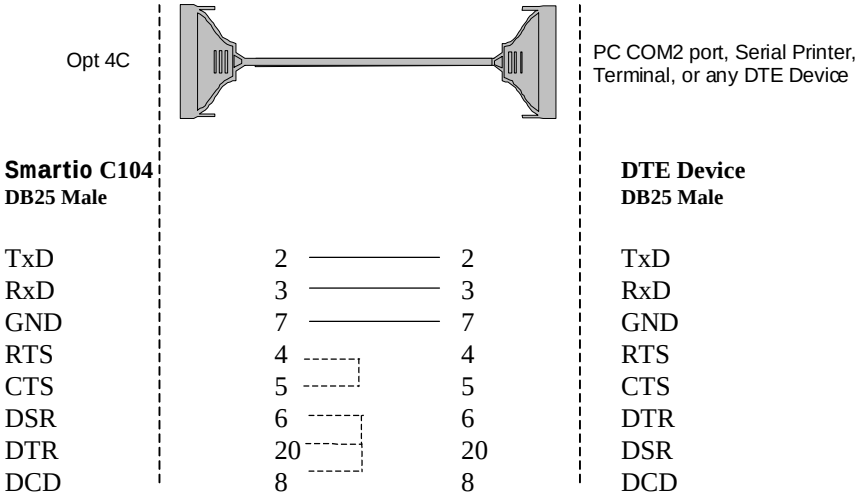
Opt 4D

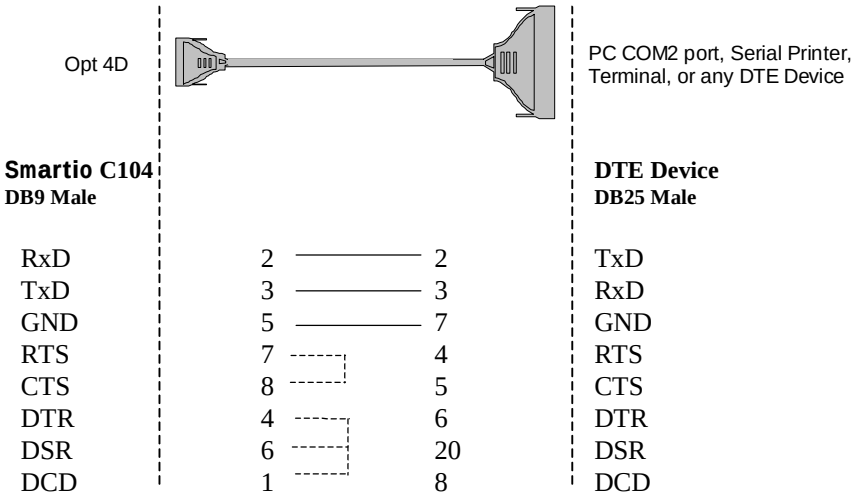
Modem
or any DCE Device

Smatio C104 **DB9 Male**		**DCE Device** **DB25 Female**
RxD	2 —— 2	RxD
TxD	3 —— 3	TxD
CTS	8 —— 4	CTS
RTS	7 —— 5	RTS
DTR	4 —— 6	DTR
DSR	6 —— 20	DSR
GND	5 —— 7	GND
DCD	1 —— 8	DCD

Type 3: To connect Smartio C104 Series to a DTE with 3-pin wiring.

If the "**Hardware flow control**" feature is set to "**ON**", you must loop back (or short) the RTS with CTS and DSR with DTR, DCD on MOXA site, indicated in dash-lines of the following diagrams. If the "**Hardware flow control**" feature is set to "**OFF**", you could just leave RTS, CTS, DSR, DTR, DCD open, ignoring the connection indicated in dash-lines.





6

Troubleshooting

Common Smartio C104 Series problems and possible solutions are listed below. If you still have problems, contact your dealer or Moxa for help. Or use the "**Problem Report Form**" at the end of this manual to report problems to your dealer at once for faster technical support.

General Troubleshooting

1. **The MOXA driver, while installing the driver, cannot detect the MOXA board.**

   Hardware causes and solutions:

   a. The board is not installed or missing (absent). Please install it.
   b. The board is not properly plugged in the system. If that is the case, re-install the board and make sure that it fits well in a 16-bit slot this time. Sometimes the slot for plugging the board is bad. In this case, try other slots until you find a good one.

2. **The MOXA board and driver are activated but cannot transfer (transmit/receive) data.**

   Hardware Causes and Solutions:

   a. Check for wrong cable wiring. Refer to the "Connection Cable and Cable Wiring" chapter for precise pin outs of the connector type you are using.
   b. The cable or the board is defective. You may use other ports, cables or boards to verify. In addition, the *PComm* "Diagnostic" utility for Windows NT and Windows 95/98 is good for testing MOXA boards and port conditions. If Diagnostic reports error, replace the faulty components.

Software Causes and Solutions:

a. Smartio C104 Series checks the line status (CTS) before it sends data out if the RTS/CTS flow control feature is set to "Enable" in the configuration or application program. Please refer to the "Connection Cable and Cable Wiring" chapter for proper wiring. Check the line status of the suspected port using the diagnostic LED indicators on the mini tester.
b. Perhaps the application controlling the board is not correctly written according to the corresponding API of the operating system. To verify, please run an existing and known good application or the provided utilities by Moxa. For example, under Windows NT and Windows 95/98, *Pcomm* "Terminal emulator" or "HyperTerminal" utilities are good for testing the COM ports.

3. Why the DOS utility IQ-IRQ can not access Smartio C104 Series to configure?

There are several reasons that may lead to this trouble:
a. The user forgets or does not know the Configuration Access Port (CAP) of the board. See next problem **4** for how to solve this problem.
b. The CAP of the board conflicts with other add-on boards' I/O address. Please change other add-on boards' I/O address to avoid the conflict.
c. The Smartio C104 Series board is not plugged in a right or good slot. Please plug the board in a good 16-bit ISA slot.
d. The Smartio C104 Series board may malfunction. Please return for repair.

If any existing board has the same I/O address as 0x180, the **default** CAP address, or the 1st port's I/O address, you must try to avoid the conflict by doing either one the following.

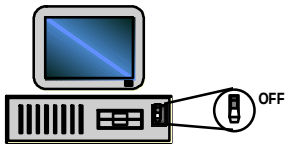
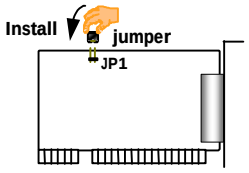
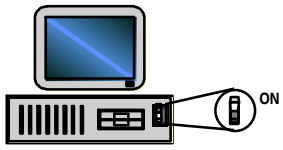
a. Install a jumper (short) at position JP1 on the upper-left corner of the board. This will force the CAP address to 0xA700.
b. Change or disable the existing board's I/O address.

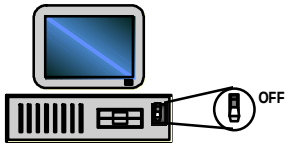
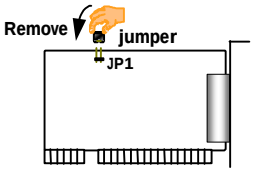
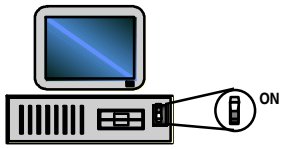
4. What to do if user forgets or does not know the Configuration Access Port (CAP) address of Smartio C104 Series?

The Smartio C104 Series multiport boards are designed without jumper or switch, so the configuration is completed only by DOS utility Io-irq.exe.

To configure the board, you need to know the board's Configuration Access Port (CAP) address. Because the CAP address is the only channel, via which the Io-irq.exe can access to the board.

The following procedure instructs user to recover once the CAP is unknown.

Step 1.	Power off the PC.	
Step 2.	Install jumper onto the JP1 of the board.	
Step 3.	Power on the PC. Now the CAP address of the board will be 0xA700.	
Step 4.	Execute Io-irq under DOS environment. A:> **Io-irq**	
Step 5.	Enter CAP address 0xA700 to access the board. *Enter the "Configuration Access Port" in HEX:* **A700**	
Step 6.	The previous hardware configuration will be shown. *Modify them if necessary. Remember the CAP address this time.*	
Step 7.	Exit the IO-IRQ.	

Step 8.	Power off the PC.	
Step 9.	Remove the jumper on position JP1.	
Step 10.	Power on the PC.	

Windows NT

This section is specific for troubleshooting under Windows NT. For general problems and solutions, please see the previous section, "General Troubleshooting".

1. **After the system reboots, the error message "Another driver in the system, which did not report its resources, has already claimed the interrupt used by xxx." appears in the Event Log.**

   This indicates that the MOXA board is found, but the IRQ is conflicting with another adapter. Please make sure there is no conflict with other adapter's IRQ. Check the BIOS IRQ settings first. Make sure that an IRQ is available.

2. **After the system reboots, the error message "Cannot find any configured MOXA Smartio/Industio Series board!" appears in the Event Log.**

a. Some partial decoded network board may interfere with our board. Please avoid from using 0x300 as I/O address for those network boards.
b. Check hardware configuration of Smartio C104 Series board by IO-IRQ.EXE. Then make sure the hardware configuration, including I/O addresses for each port, Interrupt Vector, IRQ, is identical to that of the driver.
c. The I/O addresses may conflict with other devices, please change another set of I/O address such as I/O:0x280, Interrupt Vector:0x2C0.
d. The board(s) is not plugged properly. Please make sure the board is seated firmly in the expansion slot.
e. The slot for plugging the board is defective.
In this case, please try other slots until you find a good one.
f. The board might be defective.

3. The COM number of the Smartio C104 Series conflicts with others.

The COM numbers of different boards happen to be the same. Try to change the COM number mappings.

4. Windows NT system panic (blue screen).

The possible reason is an IRQ or memory conflict with other ISA Bus adapters, like LAN and SCSI boards, or the system BIOS. Please refer to the corresponding problem in the previous section, “General Troubleshooting”, for solutions.

Windows 95/98

This section is specific for troubleshooting under Windows 95/98. For general problems and solutions, please see the previous section, “General Troubleshooting”.

1. The system fails to find the Smartio C104 Series board! After system reboots, error message “Smartio C104 Series (CAP=0x0180, port 1=COM3): Board is not found” appears.

a. Some partial decoded network board may interfere with our board. Please avoid from using 0x300 as I/O address for those network boards.

b. Check hardware configuration of Smartio C104 Series board by IO-IRQ.EXE. Then make sure the hardware configuration, including I/O addresses for each port, Interrupt Vector, IRQ, is identical to that of the driver.
c. The I/O addresses may conflict with other devices, please change another set of I/O address such as I/O:0x280, Interrupt Vector:0x2C0.
d. The board(s) is not plugged properly. Please make sure the board is seated firmly in the expansion slot.
e. The slot for plugging the board is defective.
In this case, please try other slots until you find a good one.
f. The board might be defective.

DOS

This section is specific for troubleshooting under DOS. For general problems and solutions, please see the previous section, "General Troubleshooting".

1. After executing SER-DRV.EXE, error message "None serial port found!" appears.

a. Make sure you're using the right driver.
b. Check if the board is properly plugged into ISA/EISA bus slot.
c. Check if the I/O address and IRQ settings in SETUP program are same as the settings on board.

Appendix

Technical Reference

Specifications

- Bus interface: ISA (EISA compatible)
- Number of ports: 4
- I/O address: 0x0000 ~ 0xFFFF
- IRQ: 2, 3, 4, 5, 7, 10, 11, 12, 15
- Data bits: 5, 6, 7, 8
- Stop bits: 1, 1.5, 2
- Parity: none, even, odd, space, mark
- UART: 4 ¡ Ñ16550C or compatible
- Speed (bps): 50 ~ 921.6K
- Connectors: 4 ¡ DB25 (Opt 4C)or DB9 male (Opt 4D)
- Data signals: RS-232 ¡ TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
- Surge protection: max. 2000V (C104HS)
- Operating temp: 0 ~ 55 ¢J
- Power requirement: 90mA max. (+5V), 55mA max. (+12V), 75mA max. (-12V)
- Dimensions: 157mm ¡ 83mm
- Operating Systems: See the driver support list below.

Windows NT	P
Windows 95/98	P
DOS	P
Windows 3.x	P
Linux	R
SCO UNIX/OpenServer	C
SCO XENIX	C
QNX	C
FreeBSD	C
OS/2	C

P : Driver supported by Moxa and shipped with product
C : Driver supported by OS
R : Available by request
Note: Download the newest drivers from the MOXA FTP service

UART 16C550C

The UART chip, **16C550C**, is an intelligent asynchronous controller capable of supporting one full duplex channel that simultaneously transfers data at **921.6 Kbps**. To increase the overall data throughput, special features such as on-chip FIFO and on-chip hardware flow control are used to reduce the number of interrupts to the onboard CPU and to prevent any loss of valuable data.

PC I/O Port Address Map

The following is the list of the I/O port addresses commonly used, which is good for preventing I/O address conflict when configuring Smartio C104 Series.

IO/ Address	Device
000-01F	DMA controller 1
020-03F	interrupt controller
040-05F	Timer
060-06F	Keyboard
070-07F	Real-time clock
080-09F	DMA page register
0A0-0BF	Interrupt controller 2
0C0-0DF	DMA controller
0F0-0FF	Math coprocessor
100-1EF	not usable
1F0-1F8	Fixed disk
200-207	Game I/O
278-27F	Parallel printer port 2 (LP2:)
2F8-2FF	Serial Port 2 (COM2:)
300-31F	Prototype card
360-36F	Reserved
378-37F	Parallel printer port 1 (LP1:)
3B0-3BF	Monochrome display
3C0-3CF	Reserved
3D0-3DF	Color graphics display
3F0-3F7	Diskette controller
3F8-3FF	Serial port 1 (COM 1:)

DB37 Connector Pinouts

The following lists the pin assignments of the **DB37** connector on the bracket.

Pin no.	Signal	Pin no.	Signal
1		20	RI3
2	DCD3	21	DTR3
3	GND	22	DSR3
4	CTS3	23	RTS3
5	RxD3	24	TxD3
6	RI4	25	DCD4
7	DTR4	26	GND
8	DSR4	27	CTS4
9	RTS4	28	RxD4
10	TxD4	29	RI2
11	DCD2	30	DTR2
12	GND	31	DSR2
13	CTS2	32	RTS2
14	RxD2	33	TxD2
15	RI1	34	DCD1
16	DTR1	35	GND
17	DSR1	36	CTS1
18	RTS1	37	RxD1
19	TxD1		

Note: make shield grounded to connector.

Problem Report Form
Smartio C104 Series

Customer name:	
Company:	
Tel:	**Fax:**
Email:	**Date:**

1. **Moxa Product**: Smartio C104 Series **Model** : - C104H - C104HS **Serial Number**: _____
2. **Moxa Driver Version**: _____
3. **Moxa hardware settings**:
   3.1 Please check the hardware configuration by IO-IRQ.EXE from DOS or Windows 95/98 DOS Prompt.

PORT	1	2	3	4
I/O				
IRQ				

   Interrupt Vector: _____
   Speed: _____(High/Normal)
   3.2 Jumper JP1 on the board: - open - short
4. **Operating System**: - Windows 95 - Windows 98
   - Windows NT 3.51 - Windows NT 4.0
   - DOS - Windows 3.x - Others
5. **PC Host**: Make _____ Model _____
6. **CPU**: Speed _____MHz Make _____ Model _____
7. **BIOS**: Make _____ Version _____
8. **Problem Description**: Please describes the problem as clearly as possible, including the error message you see. We may have to follow your description to reproduce the problem.
   - Board not found. - Board found, but can't transfer data.
   - Can transfer data, but lose data. - Can transfer data, but with garbled data.
   - Others. Detailed error message description is recommended:

Return Procedure

For product repair, exchange or refund, you must:

- Provide evidence of original purchase.
- Fill out the Problem Report Form (PRF) as detailed as possible for shorter product repair time.
- Obtain a Return Merchandise Authorization (RMA) number from the sales representative or dealer.
- Carefully pack the product in anti-static package, and send it, pre-paid, to the dealer. The RMA number should show on the outside of the package, and include a description of the problem along with the return address and telephone number of a technical contact.